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GRAND JUNCTION RESOURCE AREA

GRAZING MANAGEMENT

DRAFT ENVIRONMENTAL STATEMENT

The following changes should be made in Table 1-5, pages 1-9 through 1-16. These changes carry through the remainder of the ES; all affected tables and statements will be revised prior to publication of the Final ES.

CORRECTIONS

Allotment	Allot. No.	Pres. Livestock Forage Prod. AUMs	Proposed Livestock Use AUMs	Veg. Man. and Range Facilities	Cost
Haystack	103	221	153	---	---
Blue Mesa	406	---	---	Add 14 mi. pipeline	$42,000
Carr Mesa	503a	---	1,972	---	---
Fish Park	101	420	420	---	---
Gerry Gulch	847	---	---	Delete 1 mi. fence	$ 3,000
				Delete 1 cattleguard	$ 2,000
Little Salt	507	---	2,734	---	---
East Salt	602	---	---	Add 2 wells	$28,500
				Delete 4 cattleguards	2,700
Wright Draw	405	---	---	Add 0.5 mi. fence	$ 1,500
Rabbit Valley	613	---	---	Add 470 pasture markers	$ 2,340
Barry Homestead	702	---	218	Add 90 pasture markers	$ 900
Winter Flats	713	---	---	Add 910 acres seeding	$22,750
				Add 2 mi. pipeline	6,000
				Add 1.5 mi. stock trail	2,250
				Delete 80 acres chaining and seeding	1,600
				Delete 630 acres brush beating	2,240
				Delete 7 reservoir	10,900
				Delete 1 water catch	10,000
				Delete 2 spring dev.	1,700
				Delete 5.85 mi. fence	17,400
				Delete 1 cattleguard	1,800

Corrected Grand Totals:

Total Qualifications (AUMs) - 117,179

Present Use (AUMs) - 88,326

Present Livestock Forage Prod. (AUMs) - 102,857

Proposed Livestock Use (AUMs) - 75,960

Total Cost - $1,473,580

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DRAFT
ENVIRONMENTAL STATEMENT

PROPOSED DOMESTIC LIVESTOCK GRAZING PROGRAM FOR THE GRAND JUNCTION RESOURCE AREA

Prepared by

BUREAU OF LAND MANAGEMENT
DEPARTMENT OF THE INTERIOR

State Director, Colorado State Office

SUMMARY

(X) Draft ( ) Final Environmental Statement

Department of the Interior, Bureau of Land Management

1. *Type of Action:* (X) Administrative ( ) Legislative

2. *Brief Description of Action:* The Bureau of Land Management proposes to implement a domestic livestock grazing program for the Grand Junction Resource Area (approximately 1,200,857 acres of public lands) in the Grand Junction District, located in west-central Colorado. The overall objective is to increase livestock/wildlife forage by 14,736 AUMs, from a present total of 137,359 AUMs to 152,095 AUMs, by the year 2000. Components of the proposed action are: (1) intensive grazing management through allotment management plans (AMPs) on 1,105,760 acres (deferred rotation on 526,836 acres, rest rotation on 535,035 acres, and best pasture on 43,889 acres), (2) less intensive management AMPs on 79,210 acres, (3) elimination of grazing on 15,887 acres, and (4) completion of the following vegetation manipulation projects and range facilities required to implement the intensive management AMPs: 3,925 acres of chaining and seeding, 3,430 acres of brush beating, 2,480 acres of P-J thinning, 1,000 acres of burning, 58 reservoirs, 7 catchments, 34 spring developments, 4 wells, 138 miles of pipeline, 128 miles of fence, 27 cattleguards, and 8 miles of roads and trails.

3. *Summary of Environmental Impacts:* Vegetation would improve in quantity and quality; plant vigor and production would be increased from 136,754 AUMS to 152,111 AUMs. Runoff and erosion would decrease as a result of improved watershed conditions. Deer numbers would increase by 1,457 and elk numbers by 13 as the terrestrial habitat improved. Aquatic and riparian habitats would decline or stabilize on most areas.

Livestock grazing and income would be reduced in the short term but would eventually be increased as vegetation improved. Ranching costs would increase. Visual quality and recreational usage would be slightly affected. Some cultural sites would be damaged.

4. *Alternatives Considered:*

A. No Action
B. Continuation of Present Grazing Management
C. Elimination of Grazing
D. Wildlife Effective
E. Watershed Effective
F. Elimination of Spring Grazing

5. *Comments Requested from the Following:*

See attachment.

6. *Date Draft Statement made Available for E.P.A. and the Public:*

COORDINATION IN REVIEW OF DRAFT ENVIRONMENTAL STATEMENT

COMMENTS ON THE ENVIRONMENTAL STATEMENT WILL BE REQUESTED FROM THE FOLLOWING AGENCIES AND INTEREST GROUPS:

Federal Agencies
- Department of the Interior
  - Geological Survey
  - Bureau of Reclamation
  - Fish and Wildlife Service
  - National Park Service
  - Heritage Conservation and Recreation Service
- Department of Agriculture
  - Forest Service
  - Soil Conservation Service
- Department of Energy
- Environmental Protection Agency
- Advisory Council on Historic Preservation

Colorado State Agencies
- Office of the Governor
- Colorado Division of Planning-State Clearing House (Distributes to State Agencies)
- Colorado Historical Society

Utah State Agencies
- Office of the Governor
- Utah Division of Planning-State Clearing House (Distributes to State Agencies)

Local Government
- Mesa, Garfield, and Montrose County Commissioners and Planning Commission

Other Organizations
- Ada County Fish and Game League
- American Fisheries Society
- Colorado Arabian Horse Club
- Colorado Association of Soil Conservation Districts
- Colorado Cattlemen's Association
- Colorado Farm Bureau
- Colorado Four Wheel Drive Clubs
- Colorado Guides and Outfitters Association
- Colorado Mining Association
- Colorado Open Space Council
- Colorado Parks and Recreation Society
- Colorado Rivers Council
- Colorado Sportsmen Association
- Colorado Wildlife Association
- Colorado Wildlife Federation
- Colorado Wool Grower's Association
- Environmental Defense Fund
- Greenbelt, Inc.
- Izaak Walton League of America
- National Audubon Society
- National Council of Public Land Users
- Natural Resources Defense Council
- Nevada Outdoor Recreation Association
- Oregon Environmental Council
- Pacific Legal Foundation
- Sierra Club
- Society for Range Management
- Target Shooters
- Trout Unlimited
- Western Colorado Sportsmen
- The Wilderness Society

Individuals
- James Morgan
- Dick Loper

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CHAPTER 1

CHAPTER 1

DESCRIPTION OF THE PROPOSED ACTION

Background

This environmental statement for livestock grazing management has been prepared in compliance with Section 102(2)C of The National Environmental Policy Act (NEPA), 42 U.S.C. 4321 et seq. The boundaries of the ES area conform to the boundary of the Grand Junction Resource Area (map 1-1) except for several areas along the Colorado-Utah State line. These areas have been realigned to facilitate management of the grazing program for both the Bureau of Land Management (BLM) and the livestock operators (see map in map packet).

The ES Area consists of 2,046,314 acres, of which 1,200,857 acres are public lands managed by BLM (see table 1-1). This total includes eight allotments in Utah which are managed by the Grand Junction Resource Area Office to reduce administrative costs and efforts. At the present time, 138 operators graze livestock on 265 allotments. Current established allotments vary from 15 to 94,387 acres in size and carrying capacities range from 2 to 9,280 animal unit months (AUMs).

Utilization of the ES area over the last 20 years has changed due to social and economic demands and energy development from predominantly ranching to energy development (coal) and ranching with a broadening agricultural crop base and recreation use. More resource use conflicts are becoming evident and require resolution. BLM's management direction has accordingly been directed toward multiple-use goals of all resources.

The Little Book Cliff Wildhorse Area is within the ES area. It was established as a wildhorse area in 1974. Livestock grazing was eliminated on the 27,000-acre area at that time. Since grazing by domestic livestock has already been eliminated, the wildhorse area is not considered as part of the proposed action for this ES. A management plan for this area is on file in the Grand Junction BLM Office.

Objectives and Summary

Objectives

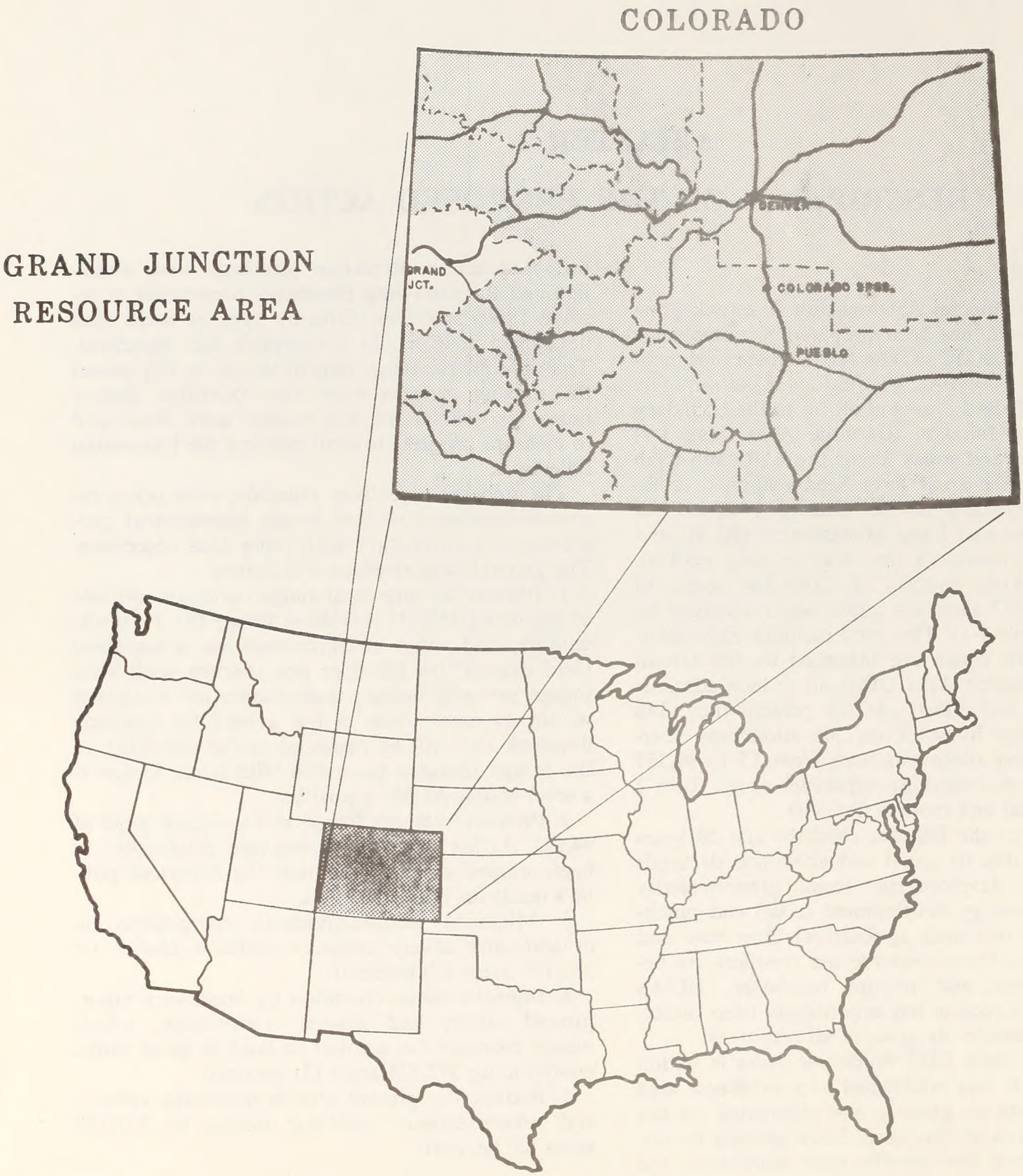
A review of planning data, the collection of additional resource data, and contact with livestock operators were the first steps in developing the proposed action. Resource problems were identified and the following objectives formulated to resolve these problems. Grazing systems were then developed that would accomplish the objectives. The appropriate range improvements to implement the grazing systems were also identified. Procedures for evaluations and studies were developed to measure progress toward meeting the formulated objectives.

The general objectives coincide with other resource objectives so that forage management progresses in coordination with other area objectives. The general objectives are as follows:

1. Provide an improved range condition capable of supplying 152,111 AUMs of forage for livestock, wildlife, and other resource uses on a sustained yield basis. (This ES does not concern itself with forage for wild horses; these horses are contained within an area which is not grazed by domestic livestock and will be managed to the capability of the forage resource to sustain wild horse forage at a level of 790 AUMs annually).
2. Provide livestock forage at a sustained yield of 94,822 AUMs annually to increase production of beef, mutton, and wool to meet the American public's needs for these products.
3. Minimize wildlife/livestock competition on critical, and severe erosion condition classes on 235,159 acres (20 percent).
4. Improve range condition by improving vigor, ground cover, and species composition, which would increase the amount of land in good range condition by 372,525 acres (31 percent).
5. Reduce the present area in moderate, critical, and severe erosion condition classes by 235,159 acres (20 percent).

Summary of Proposal

In order to achieve the identified objectives and resolve resource problems, the Bureau of Land Management (BLM) is proposing to implement an intensive rangeland management program in the Grand Junction Resource Area of the Grand Junction District. The purpose of this program is to manage the rangeland resources, which include soils, water, and vegetation, so as to provide improved vegetative conditions on 1,105,760 acres for livestock, wildlife habitat, and other resources. The



LOCATION MAP

TABLE 1-1

STATUS OF LANDS IN ES AREA

Status	Acres	Percent of Total Acres
Public Lands	1,200,857	58%
Private Lands	835,977	40%
State Lands	2,240	1%
U.S. Forest Service Lands	7,240	1%
Totals	2,046,314	100%

proposed action consists of implementing 78 intensive allotment management plans (AMPs), completing implementation of 8 existing AMPs, continuing 3 fully implemented AMPs, implementing 88 less intensive AMPs, eliminating grazing on two areas, and completing the necessary range improvements to implement these plans. See table 1-2.

Each AMP sets forth specific objectives to be attained by the year 2000. For each intensively managed allotment, specific targets have been established in terms of forage production for livestock, soils, erosion, species and quantity of vegetation, range condition, and wildlife habitat (both upland and riparian). See appendix 1.

Table 1-3 presents a summary of present and predicted conditions aggregated for all allotments.

Grazing Management

The proposed action would be implemented by the District Manager through the administrative decision process. Detailed information on implementation is presented in a later section in this chapter.

Allotment Management Plans (AMPs)

An allotment management plan (AMP) is a documented program for specific geographic areas applying to livestock operations on public lands which is prepared in consultation with the permittees or lessees involved and which (1) describes the manner and extent to which livestock operations will be conducted in order to meet objectives determined for public lands through land use planning, (2) describes the type, location, ownership, and general specifications for the range improvements to be installed and maintained on public lands to meet the livestock grazing and other objectives of land management, and (3) contains such other provisions relating to livestock grazing and other objectives as may be prescribed by the authorized officer consistent with applicable law, and (4) establishes approved levels of forage use.

AMPs would also include language which provides, among other things, "that, should periods of range depletion occur due to prolonged drought, fire, or other natural causes, or should habitat requirements of threatened/endangered flora and fauna so warrant adjustment, reduction in numbers of livestock or adjustment in periods of range use may be directed by the District Manager or his authorized representative" (43 CFR 4110.3-2).

Two categories of AMP are proposed, intensive and less intensive. Each type of AMP contains all of the above stated criteria. The only difference between the two is that intensive AMPs contain a specific grazing system.

INTENSIVE AMPs

The eleven existing intensive AMPs (fully or partially implemented) comprise 281,957 acres of public land. The 78 proposed intensive AMPs would be implemented on 823,803 acres. These AMPs propose one of the three types of grazing systems described below.

Grazing Systems

A grazing system is a scheme of grazing management that provides for grazing at a specific time of year and on a specific portion of land (pasture).

Type of vegetation, current resource condition, topography, elevation, amount of private and public acres involved, needs of ranchers' operations, existing improvements, and economic feasibility were all considered in designing grazing systems. One or more of these factors determined the type of grazing system selected to meet the needs of the various basic resources (water, soil, vegetation, and wildlife). The individual grazing systems were selected and designed by BLM range conservationists in consultation with other BLM resource specialists (wildlife biologists, and watershed and soils specialists) and the livestock operators.

The primary concern of the grazing systems is to maintain and/or improve renewable resources. According to Hormay (1970) this can be achieved almost entirely by timely resting of the range from use. The grazing systems would place livestock in designated pastures or areas for specified periods of time, thus providing vegetation in other areas a period of rest from defoliation by livestock.

The purposes of the rest period are numerous. It would allow (1) plants the opportunity to make and store food, to recover vigor, and to produce seed, (2) seeds to ripen, (3) seedlings to become established, (4) litter mulch to accumulate between plants, and (5) aid in overcoming effects of livestock trampling, soil compaction, decreased infiltration, and increased runoff (Hormay 1970).

Livestock generally use the more accessible areas of allotments most heavily, leaving the least accessible areas little used or unused. By installing control facilities and instituting grazing systems, range utilization can be made more uniform.

Martin (1975) stated that "heavy stocking for a short period reportedly results in more even utilization of forage both from place to place and among species. Consequently, the favored forage plants have a better chance than under systems where cattle have an opportunity to be more selective."

The total acreage grazed during the course of a year under the grazing systems would be approximately 818,262 acres, about 68 percent of the public lands involved. Yearlong rest would be allowed for 287,498 acres, about 24 percent of the public land. Additional rest, less than yearlong,

IN REPLY REFER T

CO-922
1792 (NR03)

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
COLORADO STATE OFFICE
ROOM 700, COLORADO STATE BANK BUILDING
1600 BROADWAY
DENVER, COLORADO 80202

NOTICE

The "Final Grand Junction Resource Area Grazing Management Environmental Statement" has been completed. The FES describes and analyzes the proposed livestock grazing management plan, along with six alternatives, for approximately 1,200,857 acres of public land in west-central Colorado.

The FES incorporates public and other government agency review comments that were received following the public review period for the draft ES. Reviewer comments were made at public hearings and by letter; these are given in chapter 9, along with BLM responses.

The final environmental statement is not the decision-making document; however, management decisions will be made 30 days following filing of the final environmental statement with the Environmental Protection Agency and distribution to the public. These decisions will be based upon the proposed grazing management plan, one of the six alternatives, or a combination of the best features of the proposal and alternatives. A summary document outlining management direction for the area will be prepared and made available. More specific decisions will subsequently be developed on an allotment-by-allotment basis.

Thank you for your past and future assistance in our efforts to manage public lands.

DALE R. ANDRUS
State Director

CONSERVE
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ENERGY

Save Energy and You Serve America!

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Colorado State Office
Room 700, Colorado State Bank Building
1600 Broadway
Denver, Colorado 80202

IN REPLY REFER TO
1792 (NR03)

ADDENDUM

TO

Grand Junction Resource Area
Grazing Environmental Statement

Please insert the attached comment letters (8 pages) into the Grand Junction grazing ES following page 9-20. The letters were inadvertently omitted and should be included with the final ES.

CONSERVE
AMERICA'S
ENERGY

Save Energy and You Serve America!

①

VORIES CATTLE COMPANY
P O Box 2201, Grand Junction, Colorado 81501 • Ranch (303) 242-4558 • Office (303) 242-1585
Ranch located at Glade Park

April 16, 1979

U. S. Department of the Interior
Bureau of Land Management
764 Horizon Drive
Grand Junction, Colo 81501

Attention: District Manager

Gentlemen:

I have received your letter of April 13th and also the Draft Environmental Statement on proposed livestock grazing management in the Grand Junction area. I have not tried to completely read this environmental statement because I don't have the time it would take to study such a document. I have to make a living in order to pay my taxes which pay for such foolish wastes of money by government bureaucrats.

I believe the entire environmental statement and concept behind it is nothing more or less than a waste of taxpayers money to make do work for bureaucrats in the Bureau of Land Management offices.

Anything that can be accomplished here, could have been accomplished by simply working with the range users on a one to one basis in improving any of the land used by the permitees.

I support wholeheartedly the multiple use system of land which has been in effect for many years. This allows the livestock producer to utilize some of the forage, it also allows the campers, hunters and recreationists to use the land for their purposes. I think it would be only fair if the other users besides the livestock industry paid a permit fee for their use as well.

Again, I feel the entire project has been a waste of time and taxpayer's money.

Yours very truly,

Eugene C Vories

Eugene C. Vories

ECV/db

Charter Member - Foundation Beefmaster Association

Home of Vories Beefmasters

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②

National Council of Public Land Users
P. O. Box 811
Grand Junction, Colorado 81501

Paul Marwell, President

Herbert Snyder, Secretary

24 April 79

Mr. Cecil Andrus, Secretary
U.S. Department of Interior
Washington, D.C.

Dear Sir:

Reference is made to Grand Junction Resource Area Grazing Management Draft Environmental Statement, Appendix 12, Ranch Economics Figure A12-1, Ranch Budget Model 1, Cattle 0 to [illegible], (assumed to be head). Total Ranch Expense, less Grazing Fees & Federal Land Expenses amounts to [illegible]. Total AUMs (animal unit months) amount to [illegible] less 479 on Federal land making a total on ranch land of 1,[illegible] AUMs. The average cost per AUM on private land is $10.5[illegible].

The average cost on Forest Service & BLM federal land is $2.61, including grazing association membership fees and "maintenance".

Obviously this is destructive competition for livestock operators trying to produce meat without federal land grazing permits.

In effect, this prohibits private land owners from producing livestock and severely limits meat production, resulting in artificially inflated meat prices for the nation.

Figure A12-7, Ranch Budget Model 7, for Sheep [illegible] to 1,[illegible], shows the cost for operating on private ranch land is [illegible] per AUM, compared with $2.72 average cost per AUM on federal lands.

Again, this is rank descrimination, subsidized by the government, against the private land owner trying to produce meat. The special privileges granted the federal land grazing permittee are financially descriminatory and are costing the nation's meat consumers a tremenduous amount. Add to this cost damages to the federal land watersheds, wildlife and governmental administration, and the costs of continued permitted grazing are prohibitive.

After reviewing many of these Environmental Statements, it is obvious that they have been prepared and decisions made to continue a counter-productive program at the expense of a vast majority of the citizens of the nation. These decisions have been made by BLM personnel with employment at stake and is an illegal conflict of interest.

It's time to put a stop to it!

Yours truly,

Herbert Snyder, Secretary

Copy to: District Manager, Grand Junction District
National Resources Defense Council

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③

COLORADO DEPARTMENT OF HEALTH
4210 E 11TH AVENUE DENVER 80220 PHONE 320-8333

April 23, 1979

Mr. Dale Andrus
State Director
Bureau of Land Management
Colorado State Office
1600 Broadway
Denver, CO 80202

Dear Mr. Andrus:

The Colorado Department of Health, Air Pollution Control Division, has reviewed the draft volume, Grand Junction Resource Area Grazing Management Draft Environmental Statement. Impacts on air quality are discussed briefly in Chapters 2, 3, and 5.

In Chapter 2 (2-78) the statement is made that the ES area has no major identified air quality problems This is not true. The Grand Junction area, including Fruita and Palisade, have shown regular violations of the NAAQS for total suspended particulates (TSP). The area is currently designated nonattainment by the EPA and the State of Colorado.

In Chapter 3 (3-57) notes two separate issues relating to air quality. The first is open burning. The Division has a current signed Memorandum of Intent with the BLM. This Memorandum should be reviewed and pertinent items incorporated into the final ES. Secondly, additional road construction will increase the level of particulates suspended by vehicular traffic. It may be helpful to attempt to quantify emissions from such area sources as road construction and burning.

Finally, no mention is made of the fact that the Colorado National Monument is designated a Class I area under the Clean Air Act Amendments of 1977. This designation brings a number of items into play, including Prevention of Significant Deterioration (PSD). This is an important concept, particularly as it relates to visibility. The potential impacts of burning and other identified activities adjoining this area should be discussed.

The Division appreciates the opportunity to review this document, and we look forward to seeing the final ES.

Sincerely,

James M. Lents, Ph. D.
Director
Air Pollution Control Division

RM:mq

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④

DARRELL ARNOLD
Writer, Photographer

1720 N. 7th ST.
GRAND JUNCTION
COLORADO 81501
TELEPHONE 303 243-7782

May 13, 1979

Public Comments
Grazing Management Proposals
Bureau of Land Management

To Whom It May Concern,

I would like to comment on general proposals for more intensive grazing management by the BLM.

To begin with, I believe that the time is long overdue for the BLM to sharply curtail the activities of livestock operators on public lands. The stockman has been in control of much of the BLM administered lands for the last 100 years. As a result, the ranges are in such poor condition that many of them would take another 100 years to recover if grazing was stopped immediately. We can no longer afford to allow ranchers to abuse the public lands.

Deer and elk and other natural grazers roamed this nation in uncontrolled numbers for millions of years before ranchers came in, and yet, when stockmen did arrive, they found immense vast acreages of lush grasses everywhere. Those conditions have vanished because of the stockman. A reduction in wildlife is certainly the wrong answer. A reduction in livestock is the only answer.

Stockmen claim that their private lands provide feed for wildlife, as if that gives them a right to run their stock at will on public land. But the wildlife they feed is often locked up on their ranches for the exclusive benefit of themselves. They stop trespass on their land or across their land to public land they have leased so that hunters and non-hunters alike can not benefit from the wildlife they so graciously feed and care for. Ranchers do not own our wildlife or our public lands and it is about time they realized it.

Grazing of livestock on public land is a privilege, not a right. Stockmen should have to pay higher grazing fees than the token amounts they pay now, and they should have to permit access across their land to public land that we all own and have the right to enjoy.

I urge that the BLM take every step to improve the condition of western range lands, but that certainly means controlling the rancher and his livestock

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rather than harassing already beleaguered populations of wildlife.

Sincerely,

Darrell Arnold

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⑤

May 21, 1979

District Manager,
c/o E. S. Team Leader
Grand Junction District Office
Bureau of Land Management
764 Horizon Drive
Grand Junction, Colorado 81501

Gentlemen:

RE: Young Ranches (Harold F. Young & Richard W. Young)

We have received and studied the draft environmental statement prepared by the B.L.M. We have about 10,000 acres of deeded land in Garfield County, Colorado. This is the base of our livestock operation and our operation would be greatly affected by the plans set forth in your statement.

The plan would cut our grazing permits on B.L.M. land from 8,000 AUMs to 2,000. This is a 64% cut. This kind of a cut would effectively put us out of the cattle business. We could not meet ordinary operating expenses on this basis. Taxes, labor, and operating expenses could not be met after a 64% cut. This kind of a cut is in effect a taking of our operation. We have previously agreed to a two month's reduction in the time we graze on B.L.M. lands. We have also agreed to a cut in AUMs from 12,000 to 8,000 and we think we have already cooperated in range management.

An examination of the table on pages 3-39 and 3-40 of the environmental statement, shows that we would suffer a larger cut than practically all other users.

We cannot believe the policy of the government is to allow people to make heavy capital investments in land, cattle, and equipment, which has to be based on continued usage of B.L.M. lands, and then force us out of business. Users who only get a 1, 8 or 3% cut

⑤

B.L.M. (re; Young Ranches)
May 21, 1979
Page Two.

can survive, but a 64% cut is the equivalent of taking our operation without compensation.

Your survey was made, we believe, in 1962-64. The condition of the range now is much better than at the time of your survey. We do not believe the statement accurately reflects the existing situation. A survey proposing such drastic cuts should be made on a present evaluation and not one at least 15 years old.

We would like to discuss with you the possibility of exchanging some of our deeded land with the B.L.M. so our land could all be in the incontiguous tracts. This would enable us to fence our land, keeping our stock under fence. It is not practical to now fence our land because it is too scattered.

Trusting you will consider our statement and position, we are

Yours truly,

Young Ranches

By Harold F. Young
Harold F. Young

By Richard W. Young
Richard W. Young

---

⑥

May 25, 1979

District Manager
Bureau of Land Management
764 Horizon Drive
Grand Junction, Colorado 81501

Dear Sir:

The adjustments identified in Dolores River AMP are not justified. Casto-Lines Allotment could probably use a cut because there isn't enough feed (a 71% cut would be too much).

The Dolores River and Bull Canyon Allotments do not need a cut. In past years the cattle have not used all the feed available on these allotments.

Sincerely,

Byrl Casto

United States Department of the Interior

HERITAGE CONSERVATION AND RECREATION SERVICE
MID-CONTINENT REGION
DENVER, COLORADO 80225

MAILING ADDRESS
Post Office [illegible]
Denver Federal Center
Denver, Colorado 80225

⑦

IN REPLY REFER TO
DES 79-19

May 25, 1979

Memorandum

To: District Manager, Grand Junction District Office,
Bureau of Land Management, Grand Junction, Colorado

From: Assistant Regional Director, Land Use Coordination

Subject: Draft Environmental Statement - Grand Junction
Resource Area Grazing Management

In response to your request of May 4, 1979, we have reviewed the subject document. The draft statement is generally adequate in its coverage of the environmental concerns of this agency. However, we recommend that a description of the methods used and results of the stratified random sample survey currently being conducted (p. 2-83) should be included in the final statement, along with any specific recommended mitigating measures developed in consultation with the Colorado State Historic Preservation Officer and State Archeologist.

Robert F. Stewart
for Robert J. Arkins

Audubon Society of

Western Colorado, Inc.

P.O. Box 1211
Grand Junction, Colorado 81501

⑧

May 30, 1979

BLM
Grand Junction, Colorado

Dear Sirs:

In the draft Grand Junction grazing management environmental statement we were credeted with table 3-14 although we did not see the table before the Draft came out. Chaining has a dramatic effect on bird populations and we feel the table does not give a realistic picture of the effects of chaining on bird populations.

Mature pinyon-juniper woodland can be surprising rich in breeding bird populations with some species being limited to the type such as Gray Flycatcher , Pinyon Jay, Plain Titmouse, Bush Tit, Black-throated gray warbler, and Ash-throated Flycatcher and more widespread species such as House Wren, Bewick's Wren, Scrub Jay, Mourning doves, Solatary Verio, Hairy Woodpecker, White-breasted Nuthatch, Violet-green swallow, Blue-gray gnatcatcher, Mountain Bluebird, Western Bluebird, Black-chinned Hummingbird, Coopers Hawk, Red-tailed hawk, Rock wren, Common Nighthawk, Chipping sparrow and house finch.

Chained areas are divoid of trees and are inhabitted by open country birds such as Horned Larks, Nighthawks, Rock Wrens, Brewer's sparrow, Lark Sparrow and Vesper sparrow.

Rock wrens appear more dependant on rocks than vegetation type. Mountain and Western Bluebirds, and Ash-thrated Flycatichers come to openings such as the edge of a chaining but it should be remembered: that they are hole nesters and that Pinyon Juniper is usually full of rock outcrops and small clearings which makes any inhancement to thier numbers do to chaining questionable.

Sincerely,
David Galinat
David Galinat, President

Printed By Mesa College
Graphic Communications Dept.

100% Recycled Paper

Wild Ass Canyon Ranch
P.O. Box 66
Glade Park, Colorado 81523
(303) 243-0780

⑨

June 1, 1979

U.S. Bureau of Land Management
Grand Junction District
754 Horizon Drive
Grand Junction, Colorado 81501

Re: EIS, Unit 154, Lost Canyon, Sugar Bench

Gentlemen:

We have received a copy of your very volumnous Environmental Impact Statement at a very inopportune time. This is our very busy season and our work schedule does not allow us any time for studying and attempting to interpret this document. However, I would like to express a few thoughts in relation to the items that I have been able to study.

First, from the comments made at the recent panel hearing in Grand Junction, I understand that the report is based on a 1963 study. That date alone seems to invalidate it as an authority on present day conditions. Any survey on this subject would be more relavant based probably on a 10 year average.

Our concern here, is that we have located a chart in the EIS, that indicates a cut of 22% in our AUMS for unit 154. Admittedly, we have only been in this location during two grazing seasons, one winter and two springs. The 1978 season was total non-use, primarily due to our concern over the evident overgrazing. The so-called winter season would not have been very useable due to heavy snow conditions, and I might add, did not lend itself as much winter feed for wildlife. We have upwards of 200 deer here in winter and they have pretty much stayed in our privately owned hayfields and survived very well at the expense to this ranch by causing our first cutting of alfalfa to be three (3) weeks late.

Soil conditions, terrain, and climate conditions will govern the amount of available forage. Climatic conditions will cause grazing to be different each year and will also cause changes within a given season. Stock water available will vary. Access conditions will vary in some areas due to flash floods, etc.. At this point I will mention two (2) areas that I have been able to examine personally. Also I have talked with Mr. Loren Luster, who owned and operated this spread for many years. Snyder Mesa area has fair to excellent grazing with very limited water. Only one known access to the top of the Mesa is very poor, on the east end, and goes up over solid rock. It does not lend itself to the practical movement of livestock. Luster only used it to winter horses when snow was available for drinking. The Sugar Bench area is very rough, fair grazing, adequate water, but the labor cost and weight loss appears to render it impractical for use.

⑨

As I have said, I haven't had the time available to even read your book, and I do not doubt that it contains many meritorious facts. We contend that we should be allowed to manage our grazing permit year after year to the best of our ability. If we have periods when the area will adequately support the 438 head anytime during the months of March, April and May and November, December, January and February, we should be allowed to use this at our descretion. We as ranchers, attempting to maintain the economic balance in our operations will automatically protect the environment. We intend to operate year after year, so an assumption that we are not going to protect and improve our grazing areas is not correct. To put it in the words often quoted; "We are not going to kill the goose that lays our eggs", and we hope that they are at least silver coated copper.

Please give these few comments some serious thought and allow us to prove our points.

Thank you,

Jim Hale
Jim Hale
Ranch Manager

cc: Mr. Ashley Carrithers

⑩

June 3, 1979

Dear Sirs:

In regard to the Draft Environmental statement, I would like to comment as follows:

1. I have reviewed the entire statement and believe it to be of too great an expense for the benefits claimed within it. I am for improving water and forage and range conditions as long as it is economically feasible. However, I know for a fact that on our allotment (Dugway #145) the $36,000.00 project is not justified because of the small acreage concerned, the number of people that use it, the few cattle that use it, or the benefits planned on it.
No one can justify or reclaim the tremendous cost of this project. At a time of the highest inflation, the taxpayers of this country cannot afford to have government officials spend our money foolishly. I saw no chart or reference to inflated cost during the 8 year implementation period. The cost is high now, and we all know it will sky rocket in the next 8 years.

2. The Fences proposed on the Dugway #145 allotment will be an increased hazard for the hundreds of deer in the area, and cause many of them to die.
The allotment is not a large enough area to justify splitting it up into pastures. Our livestock utilize the range adequately as it is at present.

3. In regard to the available feed on the Dugway allotment, there is about 2/3 blackbrush and 1/3 grasses, tumbleweeds, add other brushes. The deer primarily eat the blackbrush and the cattle eat the grasses, tumbleweeds, other weeds, and the other brushes. The cattle do not utilize 5% of the blackbrush, and therefore are not jeopardizing the deer feed at all. Our area has one of the largest deer herds in the Grand Junction resource area, and it is not because the deer are starving. To the contrary, it is because they have an abundance of feed. There is adequate feed for both deer and cattle on the allotment.

4. We have taken non-use several times in the past on the allotments, and I can verify that no degree of forage increase was seen. Primarily, because the forage in the allotment depends on annual precipitation and at the right time in order to produce feed. There are 2 enclosures on the Dugway allotment which were installed in 1973. ONe excludes both deer and cattle, and the other excludes cattle only. For 6 years, these inclosures have been rested from livestock and you can examine them and easily tell that there is absolutely no difference in forage or range condition inside or outside. This alone should show that any kind of rotation system or reduction in A.U.M.'s will not improve the feed or range condition on this allotment.

2.

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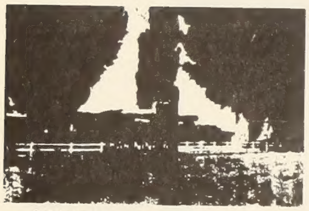
5. In the Statement, there is mentioned to the fact that the livestock are endangering the riparian habitat along the river, and it is proposed to fence the cattle from the river. I recently examined the area in question and compared it to the pictures shown in the Statement and this area looks similar to what is shown to be vigorous riparion habitat. I consider the riparion habitat to be in excellent condition, especially in consideration of the fact that the Dolores river is subject to drastic changes and pollutants. The river is in contrast from high spring flooding and flash flooding (12,000 sec. feet and more) to being nearly dry (approx. 1/2 sec. foot) at times. The river is also subjected to extremely high salt content in low water times from Paradox Valley, and an occasional acid spill and continuous pollution from Union Carbide at Uravan, Colorado.

6. At a time of the highest inflation ever, our ranch operation cannot afford a reduction in A.U.M.'s. We need 100% of our use to stay in business.

7. I believe that alternative A should be chosen, and use what we have the best that we can, and keep costs to a minimum.

Sincerely,

Jerry Lewis



⑪

BAR NINE RANCHES

Fruita, Colorado -- DeBeque, Colorado

Headquarters Route 1, Box 369
Fruita, Colorado 81521
Phone (303) 858-7977

C. R. Franklin
N. Goldine Franklin
"Chuck" Franklin
Steve Franklin

June 1,1979

Mr. Bob Kline
Enviromental Coordinator, AMP
Bureau of Land Management
Grand Junction, Colo

Dear Bpb:

I have carefully reviewed the AMP as proposed by your office for the 4A mountain above DeBeque - involving the Henderson, Hollis, & Franklin grazing permits. Parts of the plan are very good- such as brush shredding & spring improvements.

However, as a total AMP I am fully convinced that it is impractical, will not work feasibly, and is unacceptable for my operation. Please find outlined below some of my reasons for the above statement.

1. The S/E pasture on the lower end of mountain runs out of water generally by July 15. Choke Cherry & 4th Water springs always dry up by middle of summer & in dry seasons 3rd & 2nd Waters go dry before fall.

2. Turn out date for our allotment has always been from May 15 to June 5, depending on season & need. We have always gone to lower end of mountain first in order to utilize available water & earlier grass. Any turn out dates before June 10 on west end of our allotment & June 15 on Hollis & Henderson would be to early. On years when the AMP called for turn out 1st on one of these upper pastures we would have no place to hold our cattle except in some small confined area in the valley.

3. It would seem to me that with all of the cattle located at one time in one pasture more damage will result from over tramping & grazing then where fewer numbers are located over a larger area.

If the suggested plan is implemented as proposed it will force us to go out of the cattle business due largely to reasons outlined in #2, plus the cost of moving cattle two additional times each season, the prohibitive cost of maintaining fences, & the expense of trying to keep the cattle in the right pasture.

I appreciate the opportunity of expressing my viewpoint, & trust that sound judgement & reason will prevail in the final decisions.

Sincerely

Livestock Hay Grains Sugar Beets

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⑫

The original of this letter is hand written; it was typed for clarity prior to reproduction.

June 4, 1979

Dave Jones, Dist. Mgr.
Bureau of Land Management
Grand Junction District Office
764 Horizon Drive
Grand Junction, Co 81501

Dear Sir:

I am writing this in opposition to the E.S. on 4-A Mountain. I do not think the rotation of pastures will be practical for two reasons. The most important is the water situation on the lower end. The only good spring is also on private ground.

One of the pastures would be mostly private ground known as the Hollis place. I feel using private ground in such a plan is impractical.

The turn out dates for livestock is different for individual permitees and I feel some would lose valuable spring range.

Thank you.

Sincerely,

/s/ Don Brackett, Mgr.
Turner Ranches DeBeque, Co.

⑬

May 28, 1979
Collbran, Colo.

Grand Junction Reserve Area
David Jones, District
Bureau Of Land Managemant
Grand Junction District Office
Grand Junction, Colorado

To.Whom It May Concern:

I am writing this letter to give you my views on our BLM allotments.

I a gree that it is time that our BLM resources are improved, but I don't agree on the way it is being done. I don't believe it is tight to use old dates to compute todays usese I believe our climate conditions have been on the dry side for about the last 30 years or so. We have just undergone the worst drought I have seen and it takes several years with good moisture and management to get over that.

I would like to give you a rundown on our operation and how we ~~runrour~~ allotments. I don't feel it is right that you give us a cut in our A.U.M.s. We have 633 A.U.M east of DeBeque in the Horsethief Canyon area, that we call Sunnyside. We have two allotements that are private and one allotment which we run in common with cattle or springtime use. We use our allotment for winter grazing with sheep. With the three pastures and the number of sheep we run, we have been rotating our BLM pastures, trying tonot over graze them. I admit that sometimes adverse weather conditions or poor herders are hard on ranges and we have to cope with these the best we can. Sometimes we go over all allotments and cut our time or graze them lightly. I believe we have tbied to to improve our permits as much as anyone.

I will give you the number of A.U.M.s we have used the last four years so you can see what weactually use and what our permits call for.

January, February 1976 use was 126 A.U.M.s of the 633
January, February 1977 use was 205 " " " "
January, February 1978 use was not used; 38 A.U.M.s were used by Lathams in exchange for same on their deeded acres.

⑬

January, February 1979: not used.

I feel that after not using these permits for two years and having good moisture this spring and not using all the A.U.M.s since about 1972, That it is right for you to cut our A.U.M.s. For more data on these allotments, please look in the BLM files.

I also feel that any good stockman who runs sheep of cattle can tell the range conditions each year before he uses his permits and runs them accordingly. I also feel the BLM officials have been to lax in past years of not watching range conditions and livestock numbers and livestock management.

Another problem that has arisen on our BLM range in the last ten years are elk. This is due, I feel, to mis-management by the Fish and Game department. I feel that they relent to too many pressure groups. I don't feel that any outside groups has the right to put undue hardship of stockmen.

I feel that cutting these permits unjustly will cause undue hardships on livestock producers who are still suffering by hardstimes. Our nation wants cheap food, but not utilizing our range will mean ever higher meat prices and a scarcity of meat.

We try to run our livestock operation the same on the forest reserve as on our ranch and the BLM. We like livestock in prime condition. In order to do that, they need plenty of feed. So we are not trying or over graze any of our permits and we use them to the best of our judgements and ability, without over grazing and in cooperation with the BLM management.

Sincerely,
Leo D. Anderson

Leo D. Anderson
Anderson Hereford
Ranch
Collbran, Colo.
81624

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⑭

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
11177 West 8th Avenue
P.O. Box 25127
Lakewood, Colorado 80225

1950
June 1, 1979

Bureau of Land Management
Colorado State Office
Room 700, Colorado State Bank Bldg.
1600 Broadway
Denver, Colorado 80202

Gentlemen:

Thank you for the opportunity to review the Draft Environmental Statement for the Grand Junction Rescurce Area. We have the following comments to share with you:

1. Page i (Summary and Title Page)

   Suggest using the term "livestock" in place of "domestic livestock."

   An increase of only 13 elk by the year 2000 is insignificant. Census techniques are not accurate enough to "pick up" such small changes.

   It is not clear as to what is meant by ". . . riparian habitats would decline or stabilize. . . ." Stabilize is the question. Every riparian area mentioned in the Statement is rated either in poor or fair condition; thus, the best condition such areas can stabilize at is poor to fair. Riparian areas should not be sacrificed. We recommend actions that will result in an upward trend in the condition of all riparian areas.

2. Page 1-32 (Proposal 2). Does this include State-listed species as well as those on the Federal list? We believe the term "endangered" should always precede "threatened" as it does in the E&T Act.

3. Page 2-45 (Pronghorn). Suggest deletion of the word "antelope" to be consistent with proper usage in other sections of the ES.

4. Page 2-61 (Table 2-17). Suggest substituting "band-tailed" for "sandtail" and "sharp-tailed" for "sharptail."

⑭

5. Page 2-63 (Arthropods). In several sections of the ES, the "rare" butterfly is referred to by different scientific and common names. We suggest the one correct scientific name and most acceptable common name be used on this page, then applied consistently thereafter.

6. Page 2-78 (Existing Environment). The ES uses the term public lands to include only BLM lands. We believe this confuses the public, since there are public lands in many other ownerships. Suggest clarification.

7. Page 3-1. The words "impact" and "effect" can either have different meanings or be synonomous as used by different agencies in ES's. Perhaps they should be defined in the Glossary to avoid confusion.

8. Page 3-10 (Table 3-4). If the Black Ridge seeding had good success, why is it listed under "Projects With Unsatisfactory Results"?

9. Page 3-38 (Livestock Grazing). Near bottom of first column, it is stated that elimination of grazing on Sewemup Mesa would impact a rancher, but near the top of the second column it is stated that such loss would be negligible. Those statements seem inconsistent.

10. Page 4-1 (Range Facilities). Keeping pipelines and fences out of live streams are not mitigation measures as commonly defined. They are coordinating requirements. Same is true of items 1-6 on pages 4-4 and 4-5.

11. Page 4-5 (#6). The term crucial winter range is used several times in the ES. We believe it should be defined in the Glossary because it is easily confused with key winter range, critical winter range, etc.

12. Page 8-24. We doubt that Alternative C, Total Elimination of Grazing, meets the criteria of being reasonable.

13. Page 8-28 (near bottom of second column). Change "unsuited" to "suited."

14. Page 8-38 (first column). What is "critical riparian habitat"?. We assume all riparian habitat is critical.

⑭

3.

15. Page 8-38 (second riparian objective). Should read, "Streams potentially capable of supporting fish."

16. Page A73 (Table A7-1). The exotic sheep, Mouflon, is listed as being in the ES area but was not referred to in the ES. Also, otter, Odocoileus, and Bissell are misspelled in this table.

CRAIG W. RUPP
Regional Forester

STATE OF COLORADO
Richard D. Lamm, Governor
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE
Jack R. Grieb, Director
6060 Broadway
Denver, Colorado 80216 (825-1192)

June 8, 1979

⑮

Mr. Stephen O. Ellis
Colorado Clearinghouse
520 Centennial Building
1313 Sherman Street
Denver, CO 80203

Dear Mr. Ellis:

Enclosed are this Division's comments and recommendations on the Grand Junction Resource Grazing Management Draft Environmental Statement submitted to us for review by the Colorado Clearinghouse.

We appreciate your providing us with an opportunity to comment on this document.

Sincerely yours,

Jack R. Grieb
Director

JRG:RLH:dlh

Enclosure

cc: R. Evans
P. Barrows
P. Olson

JUN 8 1979
DIV. OF F

DEPARTMENT OF NATURAL RESOURCES, Harris Sherman, Executive Director • WILDLIFE COMMISSION, Sam Caudill, Chairman
Michael Higbee, Vice Chairman • Jay K. Childress, Secretary • Jean K. Tool, Member • Vernon C. Williams, Member
Thomas Farley, Member • Roger Clark, Member • Wilbur Redden, Member

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⑮

COMMENTS AND RECOMMENDATIONS ON GRAND JUNCTION RESOURCE AREA GRAZING MANAGEMENT DRAFT ENVIRONMENTAL STATEMENT [1]

The comments and recommendations contained herein, based on a staff and field review of the subject document by Division of Wildlife (DOW) personnel, are presented in the order in which the subjects occur in the text. Page numbers are provided to facilitate reference.

Generally speaking, this document represents a significant improvement over earlier grazing management plan draft environmental statements prepared by the Bureau of Land Management (BLM) in Colorado. The frequent mention of wildlife in the document is indicative of a greater concern shown for this resource in multiple use planning on national resource lands.

A statement in the Summary (Page i) that "Aquatic and riparian habitats would decline or stablize on most areas," is disturbing. These habitats combined, support a greater number of wildlife species and numbers of individuals per a unit area than any other habitat type. Accordingly, any decline in the condition of these habitats represents a major loss of wildlife. Because of past use, many of these habitats are not in good condition at the present time. We would urge BLM to develop a policy of protection and enhancement of aquatic and riparian habitats.

According to the text on Page 1-7, "there are five one-pasture allotments (nos. 105, 113, 133, 161 and 410) where the entire allotment would receive only one treatment per year." As range conditions improve, fall grazing would also be permitted. These statements don't seem to agree with information in Table 1-5 which shows both spring and fall grazing for Allotment Nos. 105, 113 and 133 and a fall through spring grazing on Allotment 410. Some clarification here would seem to be in order.

In Table 1-5, Pages 1-9 to 1-16, it appears that forage allocation in terms of AUM's are made for present and future use by domestic livestock while only those for present wildlife populations are listed. This raises the question as to whether domestic and wild ungulates should be treated similarly.

It is suggested that the basis for computing dietary overlap between livestock and wildlife, Page 1-27, be presented in the final environmental statement.

While reductions of sagebrush, serviceberry and oakbrush to favor native grasses and forbs would be beneficial to domestic livestock, the possible adverse impacts on big game animals should be recognized. It is possible that careful selection of areas to be treated could benefit big game by elimination of over mature shrubs that are unavailable to big game and the stimulation of new shrub growth which would be available.

⑮

As for brush treatments impacting sage grouse, Page 1-29, sagebrush removal within a two-mile radius of strutting grounds should be avoided in that these areas represent nesting areas for this species. In other areas, there is a possibility that sagebrush removal in narrow strips can improve sage grouse habitat.

In addition to consultation with the U. S. Fish and Wildlife Service, Page 1-32, there should also be consultation with DOW on possible adverse impacts of projects on threatened and endangered species. This is particularly appropriate for those species on state lists which are not on federal lists. The existence of state lists is recognized on Pages 2-63 and 2-65.

Information on vertebrate wildlife species is in Appendix 7, rather than in Appendix 9, as stated on Page 2-38.

In stating the number of deer using public lands, Page 2-38, the size of the population should be qualified by telling whether the figures represent a pre or post-season situation.

There is probably more information available on a number of the smaller wildlife species than indicated on Page 2-38. Species check lists, and mapping of some species have been done for Mesa, Garfield and Rio Blanco Counties pursuant to the Colorado Land Use Act (HB 1041). The DOW has also published latilong distribution and status information for this area for reptiles, amphibians, birds and mammals, including game and nongame species.

DOW field personnel do not agree with the mule deer population figures shown in Table 2-9 (Page 2-44). Most disturbing are those figures for Units 30 and 31, which are excessivley high. In Footnote No. 2, here and in Table 2-52, Charles Gross' name should be changed to Jack, who is employed by the Fish and Wildlife Service, rather than CSU.

Reference is made on Page 2-45 and elsewhere to "crucial" wintering area for deer. The DOW would prefer to see these identified as "critical," a term which is also used elsewhere. There is a statement on this same page that browse utilization by deer is high on winter concentration areas. Recent range analyses by DOW field personnel fail to support such a generalization.

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[1] Submitted to Colorado State Clearinghouse by Colorado Division of Wildlife, June 1, 1979.

(15)

It is probaly only of historical significance that antelope were transplanted northwest of Grand Junction in 1949 and 1950, as well as in 1968 (Page 2-45).

DOW field personnel have taken exception to many of the winter deer populations listed in Table 2-10 on Page 2-47 and have offered the following comments: Figures listed for Whitewater Creek, Chalk Mountain, Cobert Flats, Conn Creek, Dry Fork, Bookcliff and Kannah Creek are too low, while those for Coal Gulch, Big Salt and Howard Canyon are too high.

Elk distribution, as shown on Map 2-12, Page 2-53, is incomplete in the Roan Creek area, according to District Wildlife Manager Joe Gumber.

DOW personnel also have difficulty accepting some of the winter elk population estimates listed in Table 2-13 on Page 2-54. Of particular concern are these estimates for Horsethief Creek, Salt and Plateau Creek, and Hawxhurst and Brush Creek areas, all of which are judged to be too low.

Seven references cited under Additional Cattle-Elk Conflict, Page 2-57, are not included in the bibliography.

It should be mentioned the population of Canada geese on the Gunnison and Colorado Rivers, Page 2-60, is a breeding population. The importance of waterfowl habitat in the ES area should be emphasized.

In Table 2-17 (Page 2-61), change "sandtail" pigeon to "band-tailed."

The importance of riparian habitats to aquatic and terrestrial species of wildlife is emphasized on Page 2-63. It might be well to point out here, that, in addition to being extremely important to wildlife in general, riparian habitats are essential to the survival of a number of threatened and endangered species.

The Colorado Wildlife Commission, not the Department of Natural Resources, Page 2-65, has the authority for listing threatened and endangered species.

The spelling of "varmint" in second paragraph of Page 2-78 should be corrected.

If harvest and recreation statistics shown in Table 2-22 (Page 2-79) are supposed to represent entire game management units, this table contains numerous gross errors. If such is not the case, a footnote to this effect would seem appropriate.

(15)

The title of Table 3-12 (Page 3-27) "Impacts on Animals" raises the question: Impacts from what? Even the text on Page 3-26, where reference is made to this Table, fails to answer the question. A similar comment could be made relative to Table 3-13 except that the text is more helpful in this instance.

A reduction in pinon-juniper by thinning is addressed on Page 3-29. Perhaps as important as a source of food, or even more important, is the amount of thermal cover available on these winter ranges. Accordingly, the creation of small openings by the selective removal of overmature trees would probably be more beneficial to deer than a general thinning operation. Also, we recommend any reduction in the number of trees be expressed as a percentage of the total canopy rather than the number of trees that will be left per acre.

The impacts of additional fencing on wildlife is discussed on Page 3-31. Some mention should be made here to building fences to specifications developed by the DOW to minimize adverse impacts on wildlife.

There is an inference on Page 3-31 that prairie dog towns are only good for prairie dogs and blackfooted ferrets. Dog towns also provide habitat for cottontail rabbits, burrowing owls and rattlesnakes.

In the discussion of bighorn sheep on Page 3-32, no mention is made of the proposed introduction of desert bighorn sheep west of Grand Junction.

Something that may have been overlooked in the discussion of the impact of grazing systems on antelope (Page 3-32) is the possibility of pasture fencing restricting antelope movements. This would be more of a problem with woven wire fences required for sheep pastures.

A major concern over fall grazing that was omitted from the discussion on Page 3-32 is the potential conflicts between hunters and livestock.

The DOW offers the following comments on seasons of use by livestock on allotments that include deer winter ranges, Table 3-15, Page 3-33. Proposed livestock use periods on the Buniger, Burdick and Coal Gulch allotments would overlap with big game hunting seasons, while proposed livestock use periods on Little Salt, Coon Hollow and Winter Flats allotments would not only overlap big game season but would mean simultaneous use with deer during the critical winter period.

The impacts of brush beating on sage grouse mentioned on Page 3-29 should be repeated or referred to in the discussion of Impacts on Birds, Page 3-34.

(15)

While it is encouraging to see the action proposed by BLM will result in a net increase of 1,457 deer (Page 3-35), this increase of only 4.4 percent by the year 2000 will fall far short of meeting future needs. An estimated increase of 28.6 percent in the number of deer in the DOW's northwest region will be needed to meet projected needs in 1983. Since most of the resource area is within the northwest region and these lands represent some of the better deer ranges in this region, available forage for deer will be inadequate to support the number of deer the Division will need to meet future needs, according to the proposed action.

There is a difference of opinion expressed on Pages 3-35 and 36 as to the impact of overgrazing on cottonwood reproduction. If, in fact, overgrazing is the limiting factor on cottonwood regeneration, we would have to take exception to the statement that overgrazing is unavoidable.

Chapter 4 addresses mitigation measures. The DOW is disappointed at the dearth of measures to minimize adverse impacts on wildlife. Only the monitoring portion of this Chapter considers wildlife. It is recommended that this Chapter be rewritten to include mitigation for all potential adverse impacts on wildlife.

The DOW is not convinced all those adverse impacts listed in Chapter 5 as being unavoidable can't be mitigated. It is recommended BLM and DOW field personnel get together to discuss possible mitigation of these impacts before preparation of the final environmental statement. Reference is made in this Chapter (Page 5-2) to a loss of wet meadows. It is suggested that the BLM examine Executive Order 11990, Protection of Wetlands, issued on May 24, 1977, to determine if this Order would apply to the wet meadows referred to here. This suggestion would also apply to the discussion of wet meadows in Chapter 7 (Page 7-1).

MAY 16 1979

DIV. OF

COLORADO
HISTORICAL
SOCIETY

The Colorado Heritage Center 1300 Broadway Denver, Colorado 80203

(16)

May 10, 1979

Steven O. Ellis
State Clearinghouse
Centennial Building
1313 Sherman Street
Denver, Colorado 80203

Dear Mr. Ellis:

This is to acknowledge receipt of Grand Junction Resource Area Grazing Management Plan Draft Environmental Statement, Bureau of Land Management

DATE RECEIVED April 27, 1979 DATE DUE June 1, 1979

We find Cultural Resources have been adequately considered and meet the goals and objectives of the National Historic Preservation Act et alia and those of this office.

However, Page 2-84, Map 2-20, Archaeological Sites, is a map which has numerous archaeological sites located on it. This document is designed for public distribution. Since information about the exact location of archaeological resources is excluded from the Freedom of Information Act, I request that this map be excluded in the Final Environmental Statement.

Thank you for the opportunity to comment on the proposed project.

If this Office can be of further assistance, please do not hesitate to call upon ES Reviewer Betty LeFree (Office of the State Archaeologist) at 839-3391.

Sincerely,

Arthur C. Townsend

Arthur C. Townsend
State Historic Preservation Officer

cc: Dr. Bruce Rippeteau; State Archaeologist
Mr. James Hartmann; Coordinator, Historic Preservation

RICHARD D. LAMM
Governor

DIVISION OF WATER RESOURCES

Department of Natural Resources
1313 Sherman Street - Room 818
Denver, Colorado 80203
Administration (303) 839-3581
Ground Water (303) 839-3587

C. J. KUIPER
State Engineer

⑰

May 31, 1979

MAY 31 1979
DIV. OF PLANNING

MEMORANDUM

TO: STEPHEN O. ELLIS, STATE CLEARINGHOUSE

FROM: HAL D. SIMPSON, CHIEF, WATER MANAGEMENT BRANCH
FOR: DR. JERIS A. DANIELSON, DEPUTY STATE ENGINEER

SUBJECT: GRAZING MANAGEMENT FOR GRAND JUNCTION AREA

This is to acknowledge receipt of the draft environmental impact statement for the above referenced resource area. As requested, we have reviewed the statement and the following comments are presented for your consideration:

1. With respect to describing the proposed water resource improvements that are a part of this plan, the report is rather brief and does not provide sufficient detail for us to determine the impact that the grazing management plan would have on vested water rights. In order to evaluate the effects of the reservoirs and catchment basins, we need to know the location of dams and how much water will be stored. Since there are many streams in the resource area that are presently over-appropriated, we need the additional information before we can make any comments regarding the impact of the proposals.

2. Wells are also mentioned as a part of the plan; again we need to know the location of the wells and the amount of water that will be used before we can determine the impact that these wells will have on senior water right holders. We should also point out that wells cannot be constructed without well permits being issued by this office prior to construction.

In conclusion, we feel that the statement does not accurately evaluate the effects of the proposed action upon the water users of Colorado.

Hal D. Simpson
Hal D. Simpson

HDS/RLS:mvf

TABLE 1-2

SUMMARY OF PROPOSED ACTION COMPONENTS

Components	Total Federal Acres Grazed	Existing Level of Livestock Grazing[1/] (AUMs)	Proposed Level of Livestock Grazing (AUMs)	Present Available Livestock Forage (AUMs)
Implement 78 AMPs (intensive)	823,803	64,849	52,191	78,181
Complete implementation on 8 existing AMPs (intensive)	264,541	21,611	21,611	22,869
Continue present management on 3 implemented AMPs (intensive)	17,416	2,074	2,074	2,074
Subtotal	1,105,760	88,534	75,876	103,124
Implement 88 less intensive AMPS	79,210	6,263	6,263	6,263
Eliminate livestock grazing on 2 allotments	15,887	25	- 0 -	318
TOTAL	1,200,857	94,822	82,139	109,705

[1/] Based on qualifications. Licensed use was checked against qualifications and found to be within 8 percent of qualifications. Qualifications will therefore be used throughout this ES. Actual use data is not available but is considered to be very close to licensed use. Therefore, qualifications will be used to represent actual use.

TABLE 1-3

SUMMARY OF PRESENT AND PREDICTED CONDITIONS BY YEAR 2000

Forage Production [1] (AUMs)

	Present	Predicted[2]	Potential[4]
Livestock Forage Production	109,705	121,409	
Wildlife Forage Production[3]	27,049	30,702	
Total	136,754	152,111	318,376

Range Condition[1]

Class	Present (Ac)	%	Predicted (Ac)[2]	%
Good	216,885	18	575,395	48
Fair	566,403	47	458,955	38
Poor	417,569	35	166,507	14
Total	1,200,857	100	1,200,857	100

Erosion Condition[1]

Class	Present (Ac)	%	Predicted (Ac)[2]	%
Stable	50,191	4	60,042	5
Slight	255,035	21	480,343	40
Moderate	588,727	49	516,369	43
Critical	278,184	23	120,086	10
Severe	28,720	3	24,017	2
Total	1,200,857	100	1,200,857	100

NOTE: Erosion condition and range condition are determined by different criteria; therefore, they are not directly related. See appendix 3.

[1] Methodologies are in appendix 3.

[2] Future refers to the year 2000 A.D.

[3] Includes only deer and elk forage.

[4] Derived from SCS site potential, includes all vegetative growth.

would result in livestock being on one-third or less of the total public lands acreage at any given time.

Seasonal grazing is the rule on any one pasture in this area. Only three allotments (nos. 140,155 and 167) containing 181 AUMs have yearlong grazing. The AMPs (intensive) would prescribe rotation grazing plans in which no pasture is grazed in the same season through consecutive years.

The following paragraphs discuss the three major grazing systems: deferred rotation, rest rotation, and best pasture. (The terminology follows that of Steger 1970). Table 1-4 summarizes the number of allotments, AUMs, and acres of public land under each system.

DEFERRED ROTATION GRAZING (526,836 ACRES)

In deferred rotation systems every pasture is grazed every year, but the timing of grazing and resting treatments is rotated among pastures in succeeding years.

Many allotments could not be divided into a sufficient number of pastures of similar capacity to develop a feasible and effective rest rotation system. (The average rest-rotation system in the ES area has 4 pastures). If only one or two pastures exist under a rest rotation system, the yearlong rest of one pasture works a severe hardship on the livestock operator. If, on the other hand, a small allotment having relatively few livestock numbers is divided into three or more pastures, the cost of implementing the system could become uneconomical and result in negative returns. Therefore, small allotments are better suited to deferred rotation.

Fifty percent of the deferred rotation allotments are relatively small--under 4,000 acres. Some large allotments are in an arid environment, giving them the capability to support only limited livestock numbers. Several allotments have extensive areas which are inaccessible to livestock.

Factors other than size also dictated the choice of grazing system. Some allotments have natural barriers which would seriously impede the movement of livestock demanded by rest rotation systems. Other allotments could not be divided into a sufficient number of pastures of *equal* capacity due to a lack of water or forage in certain areas; these allotments would be managed under a single-pasture deferred rotation system.

Grazing would typically be delayed until the attainment of some specified stage of range readiness (6-inch green height of key grasses, approximately May 1) or seedripe of key grasses and forbs (approximately August 10). By deferring or delaying the grazing period through the spring and summer, it has generally been found that the better forage plants (perennial grasses and forbs) show the greatest improvement (Martin 1973, Reardon and Merrill 1976). The improvement in these plants is reflected in increased vegetative production. In addition, plants have an opportunity to increase vigor, produce seed, accumulate litter, and provide for seedling establishment (Stoddard and Smith 1955, Laycock 1961, Freeman 1964, Reardon and Merrill 1976, and Hickey 1966).

As shown in table 1-5, the 59 allotments (including two allotments scheduled for deferred rotation on one set of pastures and rest rotation on a second set of pastures) scheduled for deferred rotation grazing would be divided into two to six pastures each. These allotments are usually not large but would lend themselves to rotation with private land or National Forest allotments. Yearlong rest would not be provided in any pasture under deferred rotation.

A deferred rotation cycle is shown in figure 1-1. While this figure portrays a three treatment system, other treatment systems are also a part of the proposed action. Great versatility is possible in designing deferred rotation systems. Short grazing seasons have been planned to meet specific plant requirements.

There are five one-pasture allotments (nos. 105,113,133,161 and 410) where the entire allotment would receive only one treatment per year. In each case, initially, the entire allotment would be rested throughout every third year. When livestock forage production responded to the management practices and range trended upward, fall grazing periods would become available to livestock. (See chapter 4 for procedures used in determining range trend.)

REST ROTATION GRAZING (535,035 ACRES)

Rest rotation grazing plans which incorporate a yearlong rest are considered to be highly desirable for this region. In the past, many areas have been grazed at the same time of the year and plant requirements have been neglected. For this reason, and also because of the low rainfall and soil productivity which characterize the region, the rest period designed into rest rotation systems is very important. (It should be noted, however, that response to grazing management would be slower in the ES area than in areas of high rainfall). Therefore, in allotments where pastures could be designed for it, a rest rotation system was chosen. Fifty percent of the allotments designated for rest rotation are over 10,000 acres in size. In addition, water would be available for each pasture and topographic barriers to livestock movement would not be a serious problem.

In rest rotation systems the range is divided into pastures, each of which is periodically grazed and rested. This improves or maintains vegetation, soil, watershed, and other resource values while at the

TABLE 1-4

PROPOSED GRAZING SYSTEM SUMMARY

Grazing System	No. of Allotments	Total AUMs	Total Acres Public Land
Deferred Rotation	60[1/]	33,384	526,836
Rest Rotation			
two treatments	1	1,876	24,875
three treatments	18	27,157	351,477
four treatments	4	4,695	79,553
five treatments	3	4,226	60,569
six treatments	1	1,218	18,561
Subtotal	27	39,172	535,035
Best Pasture	2	3,320	43,889
TOTAL	89	75,876	1,105,760

[1/] Includes two allotments scheduled for both deferred and rest rotation systems.

TABLE 1-5

SUMMARY OF INTENSIVE MANAGEMENT AMPSs

Allotment[1/]	Allotment Number	Public Land Acres	Kind of Livestock[2/]	No. Pastures	Season of Use	Total Qualifications AUMs[3/]	Present Use AUMs[4/]	Present Livestock Forage Production AUMs[5/]	Proposed Livestock Use AUMs[6/]	Proposed Wildlife Allocations for Present Population AUMs[7/]	Vegetation Manipulations and Range Facilities[8/]	Units	Total Cost
Deferred Rotation													
Haystack	103	1,352	C	2	05/15 - 11/15	153	153	57	57	315	Fence	1.6 mi.	$ 4,800
South of the Road	105	1,350	C	1	04/13 - 05/01 09/15 - 11/01	64	57	30	30	15	None		
E. Toms Canyon (E)	106	3,788	C	3	05/01 - 05/31 10/09 - 10/17 11/01 - 12/10	205	205	205	205	14	Chaining & Seeding	365 ac.	$ 14,600
Longshore Above Rim Below Rim McKenzie	 108a 108b 108c	2,285	C	3	06/01 - 10/04	465	274	298	274	139	Fence Pipeline	1.1 mi. 3.8 mi.	$ 3,300 $ 12,300
Fessler	113	897	S	1	05/04 - 05/23 10/01 - 10/18	60	53	38	38	8	None		
Spring Creek	115	5,547	C	4	05/12 - 10/20	501	382	603	382	505	Fence Chaining & Seeding	3.0 mi. 480 Ac.	$ 9,000 $ 16,296
Aubert Bros. Lower Bench 28 Hole Duval Skinner Snyder Flats	 125a 125b 125c 125d 125e	23,058	C-S	5	04/20 - 10/20 12/16 - 05/26	2,058	1,995	2,561	1,919	609	Reservoir Pipeline Stock Trail Catchment	1 ea. 3.0 mi 1.5 mi. 1 ea.	$ 2,800 $ 9,000 $ 1,600 $ 13,000
Colo. - Black Ridge Colo. Ridge Black Ridge	 130a 130b	16,468	C	3	12/16 - 05/30	1,185	1,118	1,635	1,118	308	Fence Reservoir	1.1 mi. 5 ea.	$ 3,000 $ 3,200
Reservation	133	2,744	C-S	1	04/10 - 05/09 12/01 - 01/25	122	122	396	122	26	None		
Knowles-Little Dolores Bench Little Dolores Bench Knowles	 135a 135b	6,035	C-S	3	12/01 - 05/31	331	331	824	331	129	Fence	0.2 mi.	$ 600
Timber Ridge	137	2,120	C-S	2	06/16 - 06/30 10/01 - 11/15	221	221	595	221	17	None		

TABLE 1-5 (Continued)

SUMMARY OF INTENSIVE MANAGEMENT AMPSs

Allotment[1]	Allotment Number	Public Land Acres	Kind of Livestock[2]	No. Pastures	Season of Use	Total Qualifications AUMs[3]	Present Use AUMs[4]	Present Livestock Forage Production AUMs[5]	Proposed Livestock Use AUMs[6]	Proposed Wildlife Allocations for Present Population AUMs[7]	Vegetation Manipulations and Range Facilities[8]	Units	Total Cost
Dugway Palisade Pt. Dugway Beaver Mesa Gateway	 145a 145b 145c 145d	9,800	C	5	04/20 - 05/29 10/10 - 12/31	1,011	554	331	331	504	Fence Pipeline Well	4.0 mi. 5.0 mi. 1 ea.	$ 12,000 $ 15,000 $ 9,000
Round Knob	152	3,946	C	3	01/01 - 05/31 10/15 - 11/15	556	342	327	327	78	Fence	2.0 mi.	$ 6,000
Lost Canyon-Sugar Bench	154	32,481	C-H	6	11/01 - 05/27	2,998	2,791	2,168	2,168	685	Reservoir Pipeline Spring Fence	7 ea. 0.3 mi. 2 ea. 3.8 mi.	$ 9,202 $ 900 $ 5,300 $ 16,800
Coates Creek	161	357	C	1	04/15 - 06/02	42	26	22	22	4	None		
King W. Ton Canyon Fish Canyon Hill Creek Flats Deezer	 163a 163b 163c 163d	13,292	C	4	04/29 - 07/10 11/01 - 12/31	1,765	1,613	1,295	1,295	446	Fence Reservoir Pipeline Spring	2.0 mi. 1 ea. 7.0 mi. 2 ea.	$ 6,000 $ 1,562 $ 21,000 $ 3,134
Whitewater	203	22,300	C	1	04/20 - 06/30 10/01 - 01/13	3,231	2,422	2,569	2,422	450	Chaining & Seeding	2,000 Ac.	$ 76,000
Woodring	304	1,167	C	1	04/26 - 05/31 10/15 - 11/15	126	75	256	75	77	None		
Bulldraw	402	5,084	C	2	04/27 - 05/26 10/16 - 11/31	565	182	138	182	378	Fence Reservoir	1.0 mi. 1 ea.	$ 3,000 $ 2,000
Wright Draw	405	3,525	C	2	05/16 - 05/24 10/16 - 12/25	215	138	307	138	171	Thinning	80 ac.	$ 6,400
Blue Mesa	406	41,943	C	3	11/01 - 05/31	2,450	2,408	1,099	1,099	756	Fence Spring Catchment	0.1 mi. 2 ea. 2 ea.	$ 300 $ 3,200 $ 45,600
Bull Hill-Maverick	407	14,600	C	2	04/16 - 05/30 10/16 - 12/31	564	564	553	553	143	Fence Burning	1.4 mi. 1,000 ac.	$ 4,200 $ 8,000
Sinbad Valley	409	10,298	C	4	10/20 - 05/25	766	766	641	641	275	Fence Reservoir Pipeline Spring	1.8 mi. 1 ea. 2.0 mi. 1 ea.	$ 5,400 $ 2,100 $ 6,000 $ 1,500
Ute Creek	410	6,908	C	1	10/15 - 05/27	260	260	464	260	223	Reservoir	1 ea.	$ 2,100
Dolores River **Casto-Lines** **Bull Cny.**	 411a 411b	3,359	C	7	04/01 - 05/25	356	356	103	103	54	Fence	0.4 mi.	$ 1,200
North Creek	416	4,155	C	3	04/01 - 05/15 12/01 - 01/15	55	55	237	55	376	Fence	1.1 mi.	$ 3,300

TABLE 1-5 (Continued)

SUMMARY OF INTENSIVE MANAGEMENT AMPSs

Allotment1/	Allotment Number	Public Land Acres	Kind of Livestock2/	No. Pastures	Season of Use	Total Qualifications AUMs3/	Present Use AUMs4/	Present Livestock Forage Production AUMs5/	Proposed Livestock Use AUMs6/	Proposed Wildlife Allocations for Present Population AUMs7/	Vegetation Manipulations and Range Facilities8/	Units	Total Cost
Hubbard		27,411	C	3	04/01 - 01/15	1,040	831	2,589	831	399	Reservoir Cattleguard	1 ea. 1 ea.	$ 2,800 $ 2,000
Hubbard	419a												
S. Beaver Mesa	419b												
Dakota Rock	419c												
GML	420	3,251	C	3	04/01 - 04/30 11/01 - 12/31	350	350	129	86	72	Cattleguard	1 ea.	$ 2,000
Bergis North Mesa	424	1,783	C	1	05/16 - 09/30	160	143	464	143	88	None		
Dolores Pt.	429	7,510	C	2	04/11 - 05/30 10/17 - 12/31	1,120	1,001	910	910	238	Fence Reservoir	0.7 mi. 2 ea.	$ 2,100 $ 640
Hamilton	433	1,174	C	1	11/15 - 01/31	49	49	56	49	23	None		
Garr Mesa		31,421	C	3	05/01 - 10/31 10/01 - 05/20	2,645	2,645	2,439	2,439	895	Reservoir Fence	4 ea. 0.5 mi.	$ 7,360 $ 1,100
Garr Mesa	503a												
Post Cyn.	503b												
Corral Cyn.	503c												
Sphinx-Mitchell	503d												
Dry Cyn-Demaree	503e												
Buniger	505	1,388	C	2	05/15 - 11/15	70	60	160	60	59	None		
Lapham Canyon	506	4,953	C	4	05/16 - 09/30	451	435	276	276	239	Fence Spring	1.7 mi. 1 ea.	$ 5,100 $ 1,500
Mogensen	508	1,537	C	1	10/01 - 10/31	67	67	125	67	1	None		
West Salt	603	70,271	C-H	6	04/20 - 02/26	8,654	8,187	2,949	2,949	1,874	Fence Pipeline Cattleguard	6.1 mi. 1.3 mi. 2 ea.	$ 18,300 $ 3,900 $ 4,400
Crow Bottom	604	3,736	C	3	12/01 - 03/31	244	244	211	211	58	Fence	1.25 mi.	$ 3,750
Baker-Bitter Creek	612	14,954	C-S	2	11/01 - 05/10	1,056	1,026	1,570	1,026	65	Reservoir	1 ea.	$ 3,000
Prairie Canyon-John's Canyon	616	23,705	C	3	05/01 - 12/24	668	668	3,552	668	700	Fence Reservoir Spring	1.5 mi. 1 ea. 1 ea.	$ 6,000 $ 1,400 $ 2,000
Berry Homestead	702	2,985	S	3	04/16 - 05/25 12/08 - 02/28	218	213	347	215	114	None		
Brush Mountain	706	2,278	C	1	07/21 - 10/15	1,051	869	1,221	869	161	Fence Spring Reservoir	1.0 mi. 3 ea. 2 ea.	$ 3,000 $ 4,500 $ 100

TABLE 1-5 (Continued)

SUMMARY OF INTENSIVE MANAGEMENT AMPSs

Allotment1/	Allotment Number	Public Land Acres	Kind of Livestock2/	No. Pastures	Season of Use	Total Qualifications AUMs3/	Present Use AUMs4/	Present Livestock Forage Production AUMs5/	Proposed Livestock Use AUMs6/	Proposed Wildlife Allocations for Present Population AUMs7/	Vegetation Manipulations and Range Facilities8/	Units	Total Cost
Burdick Burdick Tater Hills	 706 747	2,996	C	1	05/01 - 05/31	267	267	700	267	103	None		
Dougherty Gulch	714	5,644	C	2	06/01 - 07/30 08/01 - 10/15	140	140	402	140	230	None		
Dry Fork	715	10,497	C	5	04/01 - 03/31	564	564	1,120	564	443	Fence Reservoir Pipeline	2.0 mi. 1 ea. 0.3 mi.	$ 6,000 $ 320 $ 900
Head of Carr Creek	721	5,804	C	2	06/16 - 08/30	250	250	440	250	228	Fence	0.5 mi.	$ 1,500
Logan End	732	1,841	C	2	06/01 - 10/31	365	365	363	363	207	Fence	1.8 mi.	$ 5,400
Logan Gulch	733	3,927	S	2	04/01 - 04/31 12/01 - 03/31	508	508	558	508	133	Reservoir	2 ea.	$ 2,436
Paddock	742	1,700	C	2	05/15 - 11/30	245	245	272	245	83	Fence	0.3 mi.	$ 900
Upper Brush Mountain	748	950	C-H	3	06/10 - 10/10	356	306	530	306	364	Fence	0.3 mi.	$ 900
Whittaker Flats	754	3,270	C-S	1	12/24 - 02/28	238	238	624	238	80	None		
4A Individual	755	310	C	1	05/01 - 05/20 09/01 - 09/30	34	34	79	34	10	None		
Spring Creek/ Coon Creek	807	4,730	C	1	05/20 - 06/30 10/01 - 11/14	550	513	1,230	513	269	None		
White Mountain	808	2,932*	C	1	04/23 - 06/22	430	401	762	401	77	None		
Wild Country	809	7,974	C	2	04/15 - 06/15	771	746	1,020	740	228	Spring	1 ea.	$ 1,500
Lyons-Anderson Lyons Anderson	 811a 811b	2,326	S	2	01/23 - 02/19	535	424	351	351	202	Reservoir	1 ea.	$ 2,500
Big Park	843	11,610	C	3	02/01 - 03/31	759	759	806	759	571	Fence Reservoir	2.0 mi. 1 ea.	$ 6,000 $ 2,640
Lower Rapid-Cottonwood **Lower Rapid** **Cottonwood**	 844a 844b	5,785	C-S	2	04/15 - 07/30 08/01 - 10/31	279	279	917	278	275	None		

TABLE 1-5 (Continued)

SUMMARY OF INTENSIVE MANAGEMENT AMPSs

Allotment[1]	Allotment Number	Public Land Acres	Kind of Livestock[2]	No. Pastures	Season of Use	Total Qualifications AUMs[3]	Present Use AUMs[4]	Present Livestock Forage Production AUMs[5]	Proposed Livestock Use AUMs[6]	Proposed Wildlife Allocations for Present Population AUMs[7]	Vegetation Manipulations and Range Facilities[8]	Units	Total Cost
Jerry Gulch	847	1,771	S	2	04/20 - 05/31	194	158	217	158	396	Fence Cattleguard	1.0 mi. 1 ea.	$ 3,000 $ 2,000
Totals		511,283		141		44,849	40,453	45,730	31,282	15,670			$ 480,640
Rest Rotation													
Fish Park (E)	101	3,863	C	3	05/01 - 06/15 10/01 - 11/15	570	570	570	570	70	None		
Bangs Canyon Bangs Canyon Files Deadhorse Landini Notch Spring Clarks Bench Upper Bench	 116a 116b 116c 116d 116e 116f 116g	40,661	S	4	01/01 - 06/16 10/01 - 12/31	2,926	2,578	5,423	2,458	766	Fence Pipeline Spring	8.0 mi. 3.1 mi. 4 ea.	$ 24,000 $ 9,000 $ 6,700
Three Canyons Burke Colo. River Radio Tower	141a 141b 141c	10,132	C-S	5	05/15 - 07/15 08/15 - 10/15	514	472	544	472	251	Fence Cattleguard	1.0 mi. 1 ea.	$ 3,000 $ 2,000
Thompson-Northeast Crk. Thompson NE Creek	 148a 148b	8,532	C	3	05/01 - 10/30	135	134	438	134	273	Reservoir	1 ea.	$ 1,050
Reinhart	150	2,190	C	3	11/01 - 05/27	80	80	131	80	30	Fence	0.8 mi.	$ 2,400
Boulder Canyon Ladder Canyon	157a 157b	5,313	C	3	05/15 - 06/28 10/01 - 11/04	440	274	563	274	128	Fence Cattleguard	0.8 mi. 1 ea.	$ 2,400 $ 1,800
Davis (E)	201	6,150	C	3	05/01 - 06/30 10/01 - 12/31	655	427	427	427	128	None		
Kannah Creek	202	29,710	C	3	05/01 - 06/30 10/01 - 01/31	7,630	3,698	2,741	2,741	391	Fence Pipeline Spring Cattleguard	5.3 mi. 8.0 mi. 1 ea. 1 ea.	$ 15,900 $ 24,000 $ 1,500 $ 2,000
Gibbler Canyon (E)	301	45,012	C	6	05/01 - 05/31 10/01 - 02/27	4,937	3,315	3,315	3,315	285	Spring Chaining & Seeding Pipeline w/Pump, Tank	1 ea. 1000 ac. 19 mi.	$ 1,500 $ 40,000 $ 65,000

TABLE 1-5 (Continued)

SUMMARY OF INTENSIVE MANAGEMENT AMPSs

Allotment1/	Allotment Number	Public Land Acres	Kind of Livestock2/	No. Pastures	Season of Use	Total Qualifications AUMs3/	Present Use AUMs4/	Present Livestock Forage Production AUMs5/	Proposed Livestock Use AUMs6/	Proposed Wildlife Allocations for Present Population AUMs7/	Vegetation Manipulations and Range Facilities8/	Units	Total Cost
Wagon Park Common (E)	302	31,385	C	3	05/01 - 05/31 10/16 - 11/15	1,397	1,164	1,164	1,164	196	Well Pipeline & Tanks	400 ft. 19 mi.	$ 10,000 $ 69,000
Palisade Flats	401	8,780	C	4	02/01 - 02/15 04/10 - 05/25 12/01 - 12/31	400	400	575	400	357	Fence Reservoir Pipeline Stock Trail Cattleguard	1.75 mi. 1 ea. 1.8 mi. 0.6 mi. 2 ea.	$ 5,250 $ 2,100 $ 5,400 $ 640 $ 4,400
Big Salt (E)	501	25,888	C	5	05/18 - 11/07	2,621	1,299	1,299	1,299	483	Reservoirs Spring Fence Cattleguard	5 ea. 1 ea. 10 mi. 4 ea.	$ 10,000 $ 1,500 $ 31,150 $ 7,200
Coal Gulch - Roan Creek	502	24,875	C	5	05/18 - 11/07	2,442	1,876	2,553	1,876	909	Fence Pipeline Spring Catchment	1.4 mi. 4.3 mi. 3 ea. 1 ea.	$ 4,200 $ 12,900 $ 7,800 $ 21,000
Hunter Wash	504	16,032	C-S	3	03/01 - 05/15 09/01 - 02/29	2,160	1,411	1,148	1,148	24	Fence	8.0 mi.	$ 24,000
Little Salt	507	32,732	C	4	11/05 - 04/30	6,850	2,734	3,056	2,199	73	Fence Pipeline	12.5 mi. 10.0 mi.	$ 37,500 $ 28,850
Mt. Garfield (E)	509	27,250	C	3	10/01 - 06/30	4,783	1,900	1,900	1,900	52	Pipelines w/Tanks Cattleguards	7.5 mi. 3 ea.	$ 22,500 $ 5,400
Badger Wash	601	8,059	S	4	11/18 - 02/28	1,379	857	1,153	840	5	Fence Stock Trail	5.0 mi. 1.0 mi.	$ 15,000 $ 320
East Salt (E)	602	94,387	C-H	5	03/01 - 02/28	15,692	9,928	9,928	9,928	1,825	Brushbeating Pipeline Fence Cattleguards	1000 ac. 14 mi. 9 mi. 7 ea.	$ 8,000 $ 42,000 $ 27,000 $ 12,600
Maluy	610	2,064	C	1	05/01 - 05/18 09/01 - 09/18	168	168	238	168	0	None		
Spears		21,385	C	7	05/01 - 11/31	1,677	1,677	2,489	1,674	820	Fence Pipeline Spring Thinning Cattleguard	3.5 mi. 2.0 mi. 1 ea. 500 ac. 1 ea.	$ 10,000 $ 6,000 $ 1,800 $ 5,000 $ 2,300
Drink Pedigo Gulch	703a												
E. End Cow Mtn.	703b												
Horse Mountain	703c												
Middle Cow Ridge	703d												
Stoner	703e												
Walker	703f												
West Cow Mountain	703g												
West Spears	703h												

TABLE 1-5 (Continued)

SUMMARY OF INTENSIVE MANAGEMENT AMPSs

Allotment1/	Allotment Number	Public Land Acres	Kind of Livestock2/	No. Pastures	Season of Use	Total Qualifications AUMs3/	Present Use AUMs4/	Present Livestock Forage Production AUMs5/	Proposed Livestock Use AUMs6/	Proposed Wildlife Allocations for Present Population AUMs7/	Vegetation Manipulations and Range Facilities8/	Units	Total Cost
Corcoran Wash (E)	704	9,776	C	5	05/01 - 06/30 09/01 - 11/30	1,296	1,296	1,296	1,296	262	None		
Rodeo Grounds Conn Creek E. Spears E. of Ranch Logan Wash McCurdy Wash W. Logan Wash	 710a 710b 710c 710d 710e 710f	19,177	C	6	04/05 - 07/31 11/01 - 12/27	1,176	1,176	1,400	1,176	1,148	Fence Reservoir	3.95 mi. 8 ea.	$ 11,850 $ 4,472
Coon Hollow	712	18,561	C	5	04/15 - 05/31 10/06 - 11/30	1,659	1,657	1,218	1,218	507	Fence Catchment & Pipeline	2.3 mi. 1 ea.	$ 6,900 $ 85,000
Henderson-4A Ridge Henderson Ridge 4A Mountain Lower 4A	 723a 723b 723c	4,094	C	3	05/01 - 12/24	1,283	1,252	1,956	1,252	251	Spring Brush Beating	4 ea. 1,130 ac.	$ 6,600 $ 9,040
Kimball Creek & Mountain Kimball Creek Kimball Mountain Carbon	 724a 724b 724c	15,275	C	10	03/01 - 11/30	807	807	2,316	807	1,201	Fence Reservoir Spring Stock Trail Catchment Brush Beating	3.3 mi. 1 ea. 4 ea. 2.0 mi. 1 ea. 270 ac.	$ 9,900 $ 2,800 $ 6,000 $ 1,600 $ 10,000 $ 2,700
Lower Roan Creek	737	5,012	C	3	05/16 - 06/15 10/16 - 10/30	206	206	474	206	133	Fence	0.7 mi.	$ 2,100
Roan Creek	744	9,261	C	3	04/15 - 06/15	448	448	2,657	448	640	Fence Cattleguard	1.1 mi. 2 ea.	$ 3,300 $ 3,578
Round Mountain	745	17,626	C	3	04/15 - 06/15 10/01 - 11/30	1,148	1,148	2,279	727	426	Stock Trail Thinning	3.0 mi. 1,900 ac.	$ 1,500 $ 19,000
Sunnyside Common (E)	801	7,403	C-S	3	04/16 - 06/30 10/16 - 02/20	1,656	1,077	1,077	1,077	624	None		
Totals		550,883		118		117,329	44,029	54,071	41,274	12,258			$ 829,400

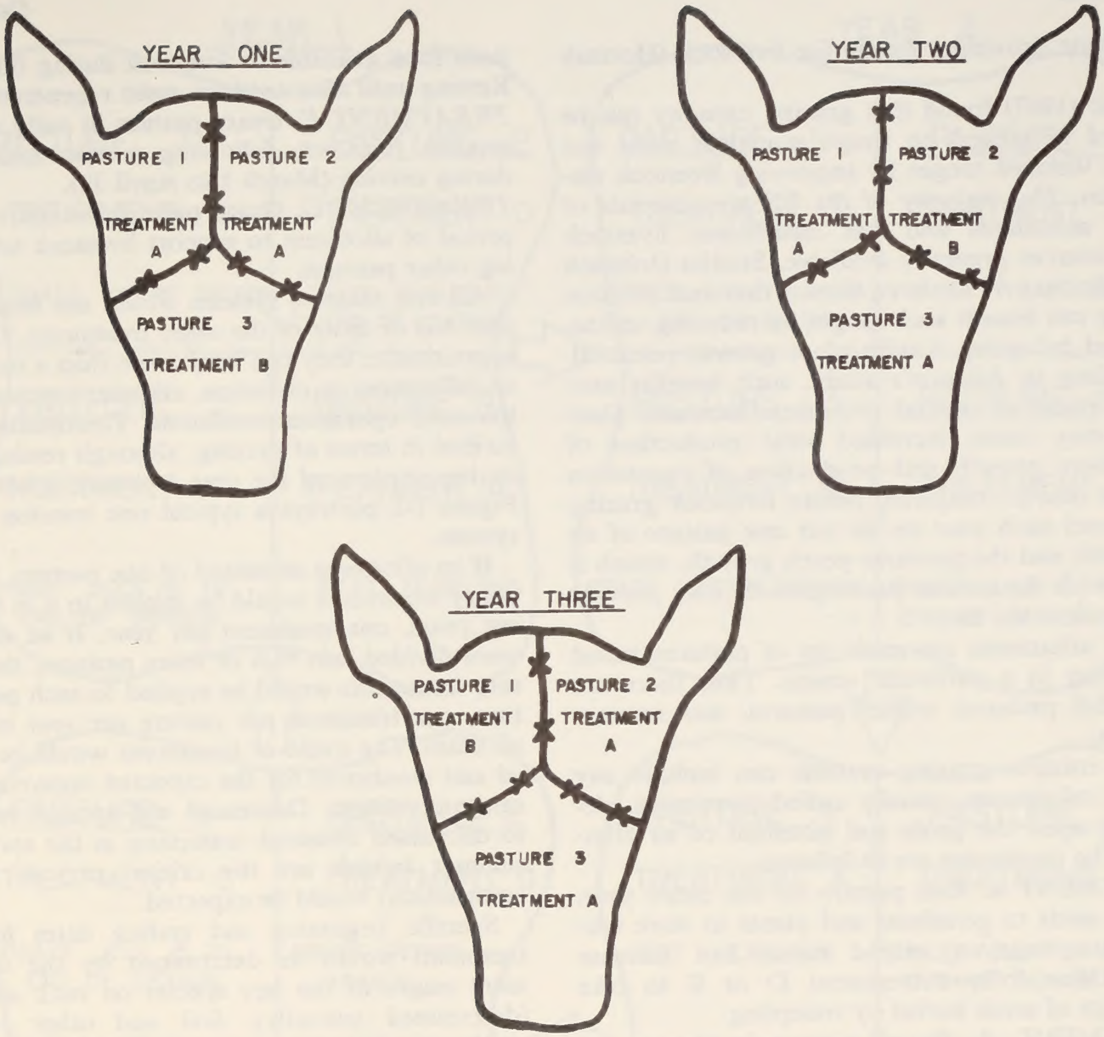
TABLE 1-5 (Continued)

SUMMARY OF INTENSIVE MANAGEMENT AMPSs

Allotment1/	Allotment Number	Public Land Acres	Kind of Livestock2/	No. Pastures	Season of Use	Total Qualifications AUMs3/	Present Use AUMs4/	Present Livestock Forage Production AUMs5/	Proposed Livestock Use AUMs6/	Proposed Wildlife Allocations for Present Population AUMs7/	Vegetation Manipulations and Range Facilities8/	Units	Total Cost
Best Pasture													
Rabbit Valley	613	16,834	S	9	11/15 - 04/15	2,840	1,547	815	815	65	Reservoir	2 ea.	$ 6,000
Winter Flats (E)	713	27,055	C	7	03/01 - 06/01 11/26 - 02/29	2,505	2,505	2,505	2,505	877	Chaining & Seeding Brushbeating Reservoirs Water Catchment Spring Development Wells Pipelines w/Tanks Fence Cattleguard	80 ac. 1030 ac. 7 ea. 1 ea. 2 ea. 2 ea. 11 mi. 5.85 mi. 1 ea.	$ 1,600 $ 8,240 $ 10,900 $ 10,000 $ 1,700 $ 20,000 $ 33,000 $ 17,400 $ 1,800
Totals		43,889		16		5,345	4,052	3,320	3,320	942			$ 110,640
GRAND TOTAL		1,105,760				117,329	88,534	103,124	75,876	28,870			$1,420,680

NOTE: Some totals in this table do not equal those shown in table 1-4. Two allotments with two different types of grazing systems were not separated in this table as they were in table 1-4.

1/ (E) = Existing AMP.
2/ Kind of Livestock: C = cattle, S = sheep, and H = Horses.
3/ Total qualifications are the total grazing privileges authorized.
4/ Active qualifications.
5/ See Appendix 3 for methodology.
6/ Does not include expected increases from vegetative manipulations.
7/ Wildlife AUMs reserved for wildlife use. Lack of data prevented computing dietary overlap with livestock.
8/ See table 1-8 for vegetation manipulation and range facility totals.



Treatment A: Graze from June 1 (average date for 6" green height of key grasses) to end of grazing season. This supports livestock while withholding use from another pasture.

Treatment B: Graze from August 10 (average date for seedripe of key grasses and forbs) to end of grazing season. This allows for plant growth and reproduction unlimited by grazing.

Note: Where necessary for range improvement two pastures can receive Treatment B, and one Treatment A. A system where all pastures receive Treatment B is a deferment without rotation. Three or more treatments are less common.

FIGURE 1-1
A Typical Deferred Rotation System on a Summer Range Allotment

same time providing forage for livestock (Hormay 1970).

Cook (1967) found that grazing capacity can be doubled or tripled on rough mountain areas and poorly watered ranges by improving livestock distribution. The majority of the ES area consists of rough mountains and has insufficient livestock water sources presently available. Studies (Johnson 1965, Hormay 1970) have shown that rest rotation grazing can benefit such ranges by reducing utilization and balancing it with plant growth potential. According to Johnson's study, such benefits may be the result of several processes: increased plant vigor may cause increased total production of vegetation; growth and production of vegetation may be nearly completed before livestock grazing is allowed each year on all but one pasture of an allotment; and the previous year's growth, which is mixed with the current year's growth, may provide more bulk in the diet.

Most allotments are made up of pastures suited to grazing in a particular season. Thus there are spring-fall pastures, winter pastures, and summer pastures.

Rest rotation grazing systems can include any number of options, usually called treatments, depending upon the goals and potential of an allotment. The treatments are as follows:

TREATMENT A. Rest pasture for the entire year. Allows seeds to germinate and plants to store carbohydrate reserves, extend roots, and increase vigor. Often follows treatment D or E to take advantage of seeds buried by trampling.

TREATMENT B. Graze pasture in the spring (April 15 to June 15) for livestock production. Grazing may extend to the flowering of key species in mid-July. Supports livestock while allowing for treatment C in other pastures.

TREATMENT C. Graze pasture after key species flower (July 15) to the end of the grazing period, but not into winter. Allows most key plants to store carbohydrates and extend roots before being grazed. Especially useful following treatment A, as it allows new seedlings time to develop grazing tolerance.

TREATMENT D. Graze pasture after seedripe of key grasses and forbs (August 10) to end of grazing period, but not into winter. Winter carbohydrate storage should be adequate in most key plants (Sampson and McCarty 1930, Trlica and Cook 1971, Drawe et al. 1972), and seed should have matured sufficiently to produce seedlings (the trampling of livestock would aid in the planting of seeds).

TREATMENT E. Graze pasture after seedripe of key shrub species and through the winter (November 16 to February 29). Shrubs, while not as grazing tolerant as herbs in winter, are the most nutritious food available to livestock during this season. Resting until after seedripe assist regeneration.

TREATMENT F. Graze pasture in early spring to support livestock following winter feeding and during calving (March 1 to April 30).

TREATMENT G. Graze pasture for entire grazing period of allotment to support livestock while resting other pastures.

All rest rotation systems would use treatment A plus one or more of the other treatments. Dates are approximate; they can vary more than a month due to differences in elevation, climate, key plants, and livestock operation conditions. Treatments are described in terms of grazing, although resting occurs during portions of the year a pasture is not grazed. Figure 1-2 portrays a typical rest rotation grazing system.

If an allotment consisted of one pasture, the necessary treatments would be applied to it in succeeding years, one treatment per year. If an allotment were divided into two or more pastures, the necessary treatments would be applied to each pasture in turn, one treatment per pasture per year in almost all cases. The cycle of treatments would be repeated and monitored for the expected improvement in range condition. Decreased soil erosion rates due to decreased livestock trampling in the spring and summer (which are the critical periods for soil compaction) would be expected.

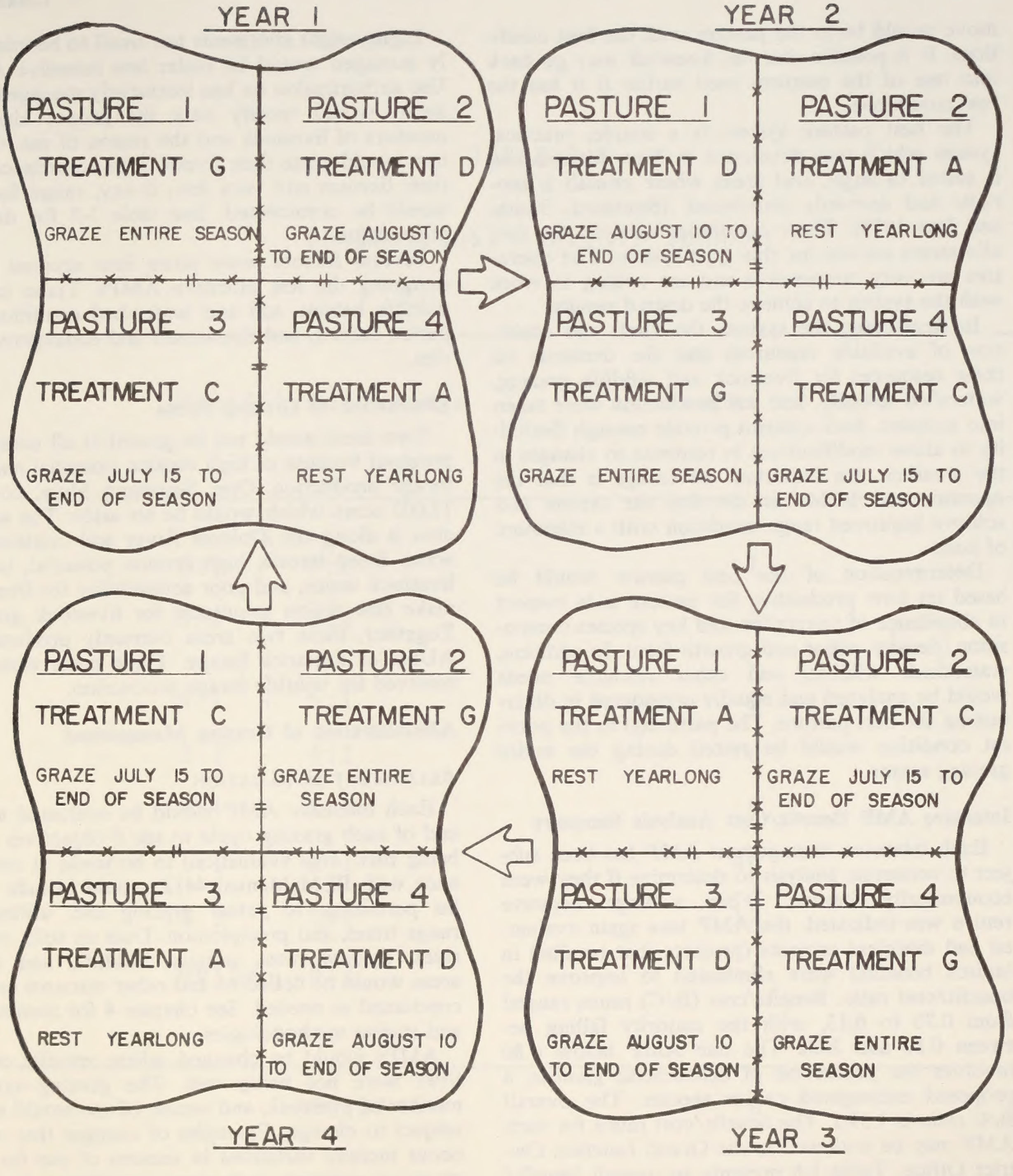
Specific beginning and ending dates for each treatment would be determined by the development stages of the key species on each allotment (determined annually). Soil and other resource needs were taken into account when grazing systems were selected and designed. The key species are an indicator of the condition and trend of all resources, especially soil and water.

Methods used in determining dates are described in chapter 4, Monitoring Programs. Most allotments would be grazed for shorter periods than those indicated by figure 1-2.

Table 1-5 identifies acres of public land, class of livestock, number of AUMs, season of use, and number of pastures for the 29 allotments under rest rotation grazing.

BEST PASTURE GRAZING (43,889 ACRES)

The best pasture grazing system is essentially a deferred grazing system tailored to fit the resource needs on the allotment. Under this system, an allotment would be divided into separate pastures. At the beginning of the grazing season, livestock would be moved into the pasture with the best conditions (see chapter 4, Monitoring Programs). When the desired utilization of forage is reached on the key species, approximately 50 percent, the livestock would then be moved to the next pasture which has the best conditions. Each succeeding



July is the approximate date for flowering of key species. August 10 is the approximate date for seed ripe of grass and forb species. Date for end of grazing season varies widely due to differences in elevation and climate.

FIGURE 1-2
Typical Rest Rotation Grazing System

move would be to the pasture with the best conditions. It is possible that the livestock may go back into one of the pastures used earlier if it has the best conditions.

The best pasture system is a simple, practical system which was developed in New Mexico and is suited to large, arid areas where rainfall is sporadic and unevenly distributed. (Stoddard, Smith, and Box 1975). These conditions exist on the two allotments chosen for this type system. The operators are very cooperative and are willing to work with the system to achieve the desired results.

In developing the system, the kinds and condition of available resources and the demands on these resources for livestock and wildlife grazing, watershed stability, and soil production were taken into account. Both systems provide enough flexibility to allow modifications in response to changes in the weather. An important advantage is that the operator and BLM can develop the system and achieve improved range condition with a minimum of cost.

Determination of the best pasture would be based on how productive the pasture is in respect to abundance of vegetation and key species composition, density, vigor and growth form. In addition, watershed, wildlife, and other resource needs would be analyzed and equally considered in determining the best pasture. The pasture(s) in the poorest condition would be rested during the entire grazing season.

Intensive AMP Benefit/Cost Analysis Summary

Each intensive management AMP has been subject to economic analysis to determine if they were economically feasible. When a large negative return was indicated, the AMP was again evaluated and marginal projects (projects that resulted in limited benefits) were eliminated to improve the benefit/cost ratio. Benefit/cost (B/C) ratios ranged from 0.70 to 6.13, with the majority falling between 0.80 and 2.00. The one AMP below 0.80 involves the protection of *Sclerocactus glaucus*, a proposed endangered cactus species. The overall B/C ratio is 1.39:1. The benefit/cost ratios for each AMP may be reviewed in the Grand Junction District Office. Table 1-6 presents an overall benefit/cost analysis summary.

Less Intensive AMPs (79,210 Acres)

LESS INTENSIVE AMPs

The 88 proposed less intensive AMPs would be implemented on 79,210 acres. These allotments involve small acreages, low productivity, high pasture fencing costs, and other factors, making it impractical or uneconomical to administer intensive management programs.

Eighty-eight allotments too small to be intensively managed would be under less intensive AMPs. Use authorization on less intensively managed allotments would specify only the proper kind and numbers of livestock and the season of use. Operators would graze their livestock in accordance with their licenses and very few, if any, range facilities would be constructed. See table 1-7 for detailed information.

Several factors were taken into account when designing the less intensive AMPs. These include wildlife habitat, soil and watershed conditions, riparian habitat, and threatened and endangered species.

Elimination of Grazing Areas

Two areas would not be grazed at all under this proposal because of high erosion potential and low forage production. One, Sewemup Mesa, contains 15,002 acres which would be set aside. The second area is along the Dolores River and contains 885 acres. Steep terrain, high erosion potential, lack of livestock water, and poor accessibility for livestock make this region unsuitable for livestock grazing. Together, these two areas currently produce 318 AUMs of livestock forage. These areas would be reserved for wildlife forage production.

Administration of Grazing Management

ALLOTMENT EVALUATION

Each intensive AMP would be evaluated at the end of each grazing cycle to see if objectives were being met. This evaluation, to be made in compliance with BLM Manual 4412, would include studies pertaining to actual grazing use, utilization, range trend, and precipitation. Data on soils, runoff rates, erosion rates, salinity, wildlife, and other areas would be collected and other resource studies conducted as needed. See chapter 4 for monitoring and studies methodologies.

AMPs would be changed where specific objectives were not being met. The grazing system, number of livestock, and season of use would all be subject to change. Examples of changes that could occur include variations in seasons of use for one or more pastures, reduction or addition in total number of pastures, changes from cattle to sheep or vice versa, reduction or increase in numbers of livestock, and changes in water locations. An environmental assessment record (EAR) would be prepared before implementation of revised AMPs.

The two areas where livestock grazing would be eliminated would be evaluated to see if the objectives--providing wildlife forage, improving range condition, and decreasing erosion--were being met (see chapter 4, Monitoring Programs). These areas would also be used as study areas to see how

TABLE 1-6

BENEFIT/COST ANALYSIS SUMMARY

Benefit/Cost Range	Number of AMPs
6:1 - 7:1	1
5:1 - 6:1	0
4:1 - 5:1	4
3:1 - 4:1	8
2:1 - 3:1	5
1:1 - 2:1	46
.8:1 - 1:1	13
Below .8:1[1/]	1
Total	78

[1/] Coon Hollow Common (Allotment 712), B/C ratio = .70:1, contains Sclerocactus glaucus, a proposed endangered cactus species.

TABLE 1-7

SUMMARY OF LESS INTENSIVE AMPs

Allotment	Allotment Number	Public Land Acres	Kind of Livestock1/	Season of Use	Proposed Use AUMs2/
Brush Hole	102	33	C	10/01 - 11/30	28
Sieber Canyon	110	1,400	C	01/01 - 02-28 11/01 - 11/30	48
Dierich Ranch	112	1,355	S	05/10 - 06/11 10/01 - 10/27	54
King - Rodgers	118	1,224	C	06/17 - 10/31	121
Wood	124	448	C	08/01 - 09/30	120
Gore Livestock	131a 131b 131c 131d	6,156	C,S	01/01 - 02/28 04/20 - 12/15	303
Moore	140	366	C	03/01 -02/28	48
North Fork	146	1,166	C	06/15 - 09/28	60
Holloway	147	413	C,S	03/16 - 04/30	14
Pine Ridge	151	1,285	C	05/25 - 10/31	120
Burford Individual	153	629	C	06/20 - 07/14	42
Cook Canyon	159	195	C	05/01 - 10/31	18
Mabie	160	66	C	06/01 - 10/31	10
Hall	162	72	C	06/01 - 06/30	5
Battleship	167	1,807	C,S	03/15 - 06/10 11/15 - 12/25	78
Little Dolores Canyon	155	1,533	C	03/01 - 02/28	97
Bean Ind.	202	360	C	12/01 - 02/28	45

TABLE 1-7 (Continued)

SUMMARY OF LESS INTENSIVE AMPs

Allotment	Allotment Number	Public Land Acres	Kind of Livestock1/	Season of Use	Proposed Use AUMs2/
Highway Ind.	204	883	C	05/20 - 05/25 11/08 - 11/30	77
Whitewater Hill	205	1,459	C	05/08 - 05/27 10/28 - 12/21	118
Kannah Creek	207	1,150	C	04/01 - 04/30 12/15 - 01/31	105
Triangle Mesa	305	3,612	C	11/15 - 01/19	96
Tom Casto	415	65	C	03/01 - 04/30	6
Unaweep North & South North South	 417a 417b	4,127	C	01/01 - 05/31 10/16 - 12/31	310
Mule Trail Draw	421	81	C	12/11 - 01/10	8
J.L. Individual	422	151	C	01/01 - 02/28 04/16 - 05/15	37
EHL & West Creek	423	381	C	02/01 - 03/31	2
South Unaweep & North Unaweep	425a 425b	963		01/01 - 03/31	21
Turner Gulch	427	1,363	C	05/01 - 09/30	60
Salt Wash	430	1,298	C	12/01 - 05/15	55
Cottonwood	431	1,308	C	12/01 - 05/10	222
Beeman	432	783	C	04/16 - 11/15	33
Nelson Ranch	428	2,461	C	05/01 - 05/28 11/15 - 12/16	175
Spann	609	26	C	03/01 - 10/31	8
Carbonera Rims	614	3,266	S	02/10 - 03/06	160
Bear Gulch	701	1,013	C	05/25 - 07/20 10/16 - 11/20	58
Burdick Homestead	707	115	C	07/15 - 10/15	21
Cameo Pasture	708	909	C	03/01 - 12/31	10
Carr Creek	709	537	C	10/01 - 11/15	153

TABLE 1-7 (Continued)

SUMMARY OF LESS INTENSIVE AMPs

Allotment	Allotment Number	Public Land Acres	Kind of Livestock1/	Season of Use	Proposed Use AUMs2/
Conn Mountain	711	168	C	05/16 - 10/31	90
Eby Point	719	602	C	06/16 - 10/15	100
Etcheverry	720	550	C	05/01 - 06/10 11/01 - 11/30	94
Kimball Foothills	728	462	C	05/15 - 07/11 09/01 - 10/15	49
Powell	730	1,935	C	06/16 - 10/20	660
Lower Brush Mtn.	735	497	C	06/16 - 10/15	128
Lower Carr Creek Comm.	736	329	C	05/01 - 05/30 10/16 - 11/30	30
Homestead	740	4,410	C	05/06 - 06/15	171
Parkes Place	743	120	C	05/16 - 06/15 10/16 - 10/31	16
Webber	750	190	C	05/01 - 05/31 10/01 - 11/15	32
Bald Hill Comm.	802	800	C	06/10 - 06/30	233
Grassy Gulch	803	445	C	06/01 - 06/15	42
Hawxhurst Comm.	804	4,618	C	05/01 - 08/31	101
Salt Creek Comm.	806	2,596	C	05/01 - 07/30	78
Alexander	810	85	C	06/01 - 09/15	14
Red Mountain	813	464	S	05/01 - 06/30	12
Guthrie	814	240	C	06/01 - 06/15	18
Webb Isolated Tracts	815	200	C	04/16 - 09/30	17
Bevan	816	120	C		18
Clifton	817	587	S	01/01 - 01/31 04/16 - 05/15	26
Davis	818	520	C	05/01 - 05/31 11/01 - 12/30	34
Ervin	819	15	C	05/01 - 10/31	10

TABLE 1-7 (Continued)

SUMMARY OF LESS INTENSIVE AMPs

Allotment	Allotment Number	Public Land Acres	Kind of Livestock1/	Season of Use	Proposed Use AUMs2/
				10/16 - 11/30	
Fetters	821	40	C	05/01 - 10/30	12
Gipp	822	120	C	05/01 - 06/15	17
Halfway House	823	734	C	05/01 - 05/31	54
Collier Creek	824	240	C	06/01 - 06/15 10/10 - 10/17	26
Hawkins, D.	825	40	C	04/16 - 05/15	30
Hawkins, O.	826	160	C	07/07 - 09/20	46
Clover Gulch Height	827a 827b	755	C	06/01 - 07/31	39
Hunter	829	200	C	06/01 - 09/15	35
Horizon	830	122	C	05/10 - 06/10	14
Jones	832	138	C	06/16 - 09/13	49
Dry Kimball-Kinney	833a 833b	2,263	C	05/16 - 06/15	61
Lloyd	835	608	C	05/16 - 10/31	111
Long	836	280	C	05/16 - 06/30	45
Heeley	837	1,870	C	04/01 - 05/31	134
Lorimor	838	240	C	06/01 - 09/01	20
Collier	839	676	C	06/15 - 10/15	97
Milholland	840	280	C	05/01 - 06/15	27
Hittle	841	440	C	07/09 - 10/15	49
Nichols	842	120	C	04/20 - 06/10	11
Chalk Mountain	845	1,493	C	05/16 - 10/31	70
Robbins	846	555	C	05/01 - 05/30	113
Berthod Place	848	160	C	06/10 - 06/25	19
Brown Place	850	814	C	03/28 - 04/27	8
Baldridge Mesa	851	742	C	05/01 - 05/31	16

TABLE 1-7 (Continued)

SUMMARY OF LESS INTENSIVE AMPs

Allotment	Allotment Number	Public Land Acres	Kind of Livestock1/	Season of Use	Proposed Use AUMs2/
Moss	852	125	C	06/15 - 10/14	36
Molina Place East of Collbran	853a 853b	973	C	04/01 - 11/30	114
Charlesworth Isolated Tracts	855	120	C	04/16 - 07/31	7
TOTALS		79,210			6,263

1/ C = cattle and S = sheep.
2/ Proposed use is the same as present use.

production, cover, etc., compare with the areas under intensive grazing management.

All the allotments being managed under less intensive AMPs or subject to an elimination of grazing would receive annual field examinations to insure compliance. These examinations would include compliance with licensed use, evaluation of vegetative condition and trend, examination of soil erosion and watershed conditions, and wildlife habitat condition and trend.

During drought conditions, such as existed in 1977, all allotments would be field checked prior to grazing. The season of use and livestock numbers would then be adjusted as necessary to protect all resources present. The level of use authorized would depend on the resource conditions. The use could range from full use to no use depending on the predicted forage production during the drought period. Grazing licenses would be adjusted to reflect any departures from normal procedures.

TRESPASS CONTROL

Provisions on control of trespass in 43 CFR 4150 and BLM Manual 4150 would be followed. Field examinations would be made at least annually on all allotments to check for correct numbers of livestock, proper dates, and proper location.

STOCKING LEVELS

Stocking levels are based on the best estimate of current grazing capacity for each intensive AMP allotment. (The stocking levels for the less intensive AMP allotments were not computed due to insufficient data on past and present use.) Grazing capacity was derived from phase I watershed transects, vegetative transects conducted by range conservationists, and existing range surveys and by comparing present use with present condition. This data provided information on species composition and density, which in turn, was used to derive an acres per AUM value for each vegetation type in each pasture of each allotment. This acres per AUM figure was then converted into a value representing forage production available for livestock. For a more detailed description of the methodology, see appendix 3.

Key plant species utilization would be limited to 60 percent. Overall utilization of livestock forage would be kept at 40 to 50 percent.

In some instances, significant reductions in stocking rates are proposed. Where existing data was determined to be insufficient to initiate and support adjustments in use and reductions in stocking levels were proposed, range surveys, forage inventories, or data rechecks, using accepted methodological procedures, would be initiated prior to issuance of a formal decision on the adjustment and implementation of the proposal. Data would be rechecked on all areas where it was considered to be insufficient. If proposed reductions are significantly different, after data rechecks, then the new stocking levels will be analyzed in an EAR.

Any party adversely affected could appeal the decision. If appeals are filed, a detailed inventory would likely be utilized to develop data needed to resolve the dispute. Deviations from the proposal could thus occur on a case-by-case basis. Rechecking of existing data and compiling of new inventory data are not expected to cause significant changes in the overall proposal. Cumulative impacts of the proposal and each alternative are therefore expected to remain as discussed in this ES.

Predicted forage increases would be available for use by the year 2000 by both livestock and wildlife. These increases are predicted to be:

Livestock: 11,704 Less 376 (wildlife) = 11,328 AUMs

Wildlife: 3,277 Plus 376 = 3,653

Note that 376 AUMs are allowed for dietary overlap between wildlife and livestock.

The current MFPs did not consider allocations of any increases in forage production. Predicted increases are allocated in this ES for the purpose of completing the analysis of the proposed action and to determine what benefits could accrue from the anticipated increases in forage production. The monitoring procedures described in chapter 4 would allow a determination of the increases that actually occurred. Actual future allocations of forage production increases would be made through the BLM planning system in accordance with applicable laws, regulations, and policy. The proposed use level would be followed until an evaluation is completed at the end of each grazing cycle (3-5 yrs.). Any increases or decreases in use would depend on the evaluation and planning system allocations.

Range Improvements

The range improvements necessary to carry out intensive grazing management are described below. Table 1-8 summarizes data on these improvements.

Vegetation Manipulation

Vegetation manipulation would be required to carry out intensive grazing management on twelve allotments. This process is useful in cases where AUMs in one pasture do not balance with other pastures in an allotment. A total of 10,835 acres would receive this treatment. Manipulation techniques include chaining, seeding, thinning, brush beating, and prescribed burning. See Proposed Projects map in packet.

TABLE 1-8

PROPOSED IMPROVEMENTS SUMMARY

Range Improvement	Unit	Total	Average[1/] Unit Cost	Total Cost
Facilities				
Reservoirs	each	58	$ 1,440	$ 83,482
Catchments	each	7	$26,370	$ 184,600
Spring Developments	each	34	$ 1,330	$ 45,134
Wells	each	4	$ 9,750	$ 39,000
Pipelines	miles	137.7	$ 3,000	$ 399,250
Fences	miles	128.1	$ 3,000	$ 395,200
Cattleguards	each	27	$ 2,000	$ 53,478
Roads/Trails	miles	8.1	$ 700	$ 5,660
Vegetation Manipulations				
Chaining & Seeding	acres	3925	$ 38	$ 148,496
Brush Beating	acres	3430	$ 8	$ 27,980
P-J Thinning	acres	2480	$ 12	$ 30,400
Burning	acres	1000	$ 8	$ 8,000
TOTAL				$1,420,680

[1/] Costs vary due to terrain, soil type, engineering design, environmental restrictions, etc.

Vegetation manipulation would be implemented in small blocks approximately 100 acres in size and would match natural openings in the area as closely as possible. If there were no natural clearings, the treated areas would be kept small and irregular in shape and would have tree islands left within the treated area. Blocks would not be contiguous, although they may be connected by natural-appearing (irregular and curved), narrow corridors less than 50 feet wide. Prior to implementation of all vegetative manipulations, a landscape architect would assist in the final design and layout. There would be no chaining, brush beating, thinning, or burning within 200 feet of any riparian habitat or wetland area. A two-year rest period would be required to enable adequate recovery.

The majority of the treatments would be located in one pasture of an allotment and the prescribed two-year rest would be enforceable. Where a treatment would be in two pastures, a temporary fence would be installed to allow the required rest from livestock grazing.

CHAINING AND SEEDING (PINYON-JUNIPER: 3,925 ACRES)

Approximately 3,925 acres of pinyon pine and Utah juniper would be chained, which would lead to a predicted increase of 204 AUMs. This would involve pulling a large ship anchor chain between two bulldozers to uproot trees. An airplane would then be used to seed the area with grasses, forbs, and shrubs. Finally, the anchor chain would be pulled over the area a second time to cover the seed and windrow trees. Approximately 130 days would be required to chain, seed, and rechain the acreage proposed for this treatment.

The species and quantity of seed would depend on the climate of the area and the objectives of vegetation manipulation. A rest period of at least two growing seasons following satisfactory germination of seeded species would be provided. The chaining procedure would be used in areas where vegetative production is very low and the potential for success is high.

The following standard operating procedures would be followed:

1. Chainings would be implemented in areas small enough so that big game hiding cover is available within 200 yards of any point in the chained clearing. Adequate hiding cover consists of at least 40 percent of an area being left as cover blocks, with each block being a minimum of 60 acres.

2. Pinyon-juniper windrows created by chaining would be kept low in profile, with frequent breaks for the passage of large animals and people.

3. A soil scientist would examine all areas to be chained prior to chaining operations. If aerial ground cover (vegetation, litter, and surface rock) would be increased or "maintained at an acceptable level" in the treatment area, then chaining would be performed. If, however, the resultant total ground cover would not be at an acceptable level, then the area would be reevaluated for other resource values. Ground cover "maintained at an acceptable level" means that sufficient amounts of vegetation, litter, and surface rock would be present to prevent accelerated erosion.

4. The chaining project would be done when soil moisture conditions are most favorable for seedling establishment and to minimize compaction to surface soils. Soil conditions would probably be best during the fall season.

5. Sod-forming grasses would be included in the seed mixture to aid in binding the disturbed soil. Revegetation would also include a combination of other desirable grasses, forbs, and shrubs in order to insure adequate wildlife winter forage.

6. The crawler tractors would pull the anchor chain on the contour and at right angles to drainages and gullies. A buffer zone would be left on either side of large drainages. The size of the buffer would be determined on a case by case basis.

7. Small check dams would be constructed and properly spaced where necessary to aid in erosion control. Spacing would depend on slope, soil type, and drainage area.

BRUSH BEATING (OAK AND SAGEBRUSH: 3,430 ACRES)

Brush beating is planned on 3,430 acres to reduce sagebrush, serviceberry, and oakbrush, allowing native grasses and forbs to grow and flourish. This would result in a predicted increase of 584 AUMs. This treatment would involve a large, rotating mower blade pulled by a tractor with a power take-off. The process is similar to mowing a lawn. The brush would be left in place on top of the soil to provide mulch and hold moisture. Seeding would not be necessary as the required native plant seed source would normally be present.

Project work would be done in the fall when soil moisture conditions are most favorable to minimize compaction to surface soils. Brushbeating equipment would be the type that creates the least soil disturbance, i.e., wheeled tractors or smaller caterpillars travelling with the contour.

Sage grouse habitat throughout the ES area and especially on the proposed brush beating sites would be inventoried prior to the action. If it is determined that areas proposed for brush beating are important to local sage grouse populations, the action would be modified to minimally affect these birds. This modification could include reduction in size, change of boundaries, or elimination of the project.

THINNING (PINYON-JUNIPER: 2,480 ACRES)

Thinning would be used in place of chaining where terrain is steep or where soil must be left undisturbed to protect watershed values. An increase of 223 AUMs is expected. A work crew using chain saws would carry out thinning operations--the number of acres thinned per day would depend on the size and efficiency of the crew. Approximately 10 to 30 trees per acre would be left standing. Trees cut would be left in place, with some being sold to the public for firewood.

Thinning allows more sunlight and moisture to reach native grasses, encouraging their growth and proliferation. A total of 2,480 acres would receive this treatment. Thinning would most likely occur in the fall.

PRESCRIBED BURNING (OAK AND SAGEBRUSH: 1,000 ACRES)

The burning of thick stands of oak and sagebrush would allow native grasses and forbs to grow and flourish. This treatment is expected to increase available forage for both livestock and wildlife by 100 AUMs.

Periodic, naturally-caused fires have played an important role in the development of forest and grassland ecosystems (Stoddard, Smith, and Box 1975). The prescribed burning of approximately 1,000 acres of dense shrub would thus imitate a natural cycle.

Prior to burning, the optimum weather conditions, burn pattern, and fuel conditions would be determined in order to achieve the desired burn intensity. Before starting the burn, natural barriers (existing roads, lakes, streams, rock outcrops, etc.) would be located and used to the maximum extent possible to control the burn. Where natural barriers were not sufficient, fire lines would be constructed using hand tool methods or a caterpillar tractor. Burn patterns could include burning inward from the control lines, or strip burning, which involves burning narrow, long strips one at a time. Spring or fall are the most likely times for accomplishing burning.

The following standard operating procedures would be followed:

1. Burning would be done on the flatter slopes and would not be permitted on slopes exceeding an average of 10 to 15 percent. In addition, burning would not be allowed in major drainages in order to leave a buffer zone for trapping soil movement.
2. A soil scientist would examine all areas to be burned prior to prescribed burning. If aerial ground cover (vegetation, litter, and surface rock) would be increased or maintained at an acceptable level in the treatment area, then burning would be performed. If, however, the resultant total ground cover would not be at an acceptable level, then the area would be reevaluated for other resource values. Ground cover "maintained at an acceptable level" means that sufficient amounts of vegetation, litter, and surface rock would be present to prevent accelerated erosion.
3. A seeding operation would be initiated as soon as practical after burning.
4. Seeding would involve drilling instead of broadcasting where terrain permits.
5. Sod-forming grasses would be included in the seed mixture to aid in binding the disturbed soil.
6. Livestock grazing would be excluded until the seedlings become well established (a minimum of 2 normal growing seasons following germination). This would best be accomplished by closing the pasture where the proposed burning treatments would occur.

MAINTENANCE OF VEGETATION MANIPULATIONS

Vegetation manipulation treatments would be repeated as necessary to maintain the desired results on an allotment. A burned area may be reburned every twenty years. A chained area could be thinned or opened to the public for Christmas tree sales after fifteen to twenty years. An environmental assessment record (EAR) would be prepared prior to implementing maintenance on any area.

Range Facilities

Construction of eight different types of range facilities would be required for the implementation of the proposal. For this proposed action, these would include reservoirs, water catchments, spring developments, wells, pipelines, fences, cattleguards, and roads and trails. Table 1-5 shows proposed range improvements by allotment; they are also portrayed on the map in the packet that accompanies this ES.

All improvements would be designed by the BLM district engineer to fit the situation for the particular area. However, these are for the most part standard throughout BLM. The details of how the improvements are constructed are given in appendix 2.

EASEMENTS

BLM would obtain easements for rights-of-way across private lands for access to existing and proposed projects. Access would also be necessary for the administration of the grazing management program. Table 1-9 lists easements by allotment. These easements would provide public access to public lands where it presently does not exist.

BLM STANDARD OPERATING PROCEDURES

The following standard operating procedures would be followed in the construction of the proposed range facilities.

TABLE 1-9

EASEMENTS BY ALLOTMENT

Allotment	Allotment No.	Type
Deferred Rotation		
Longshore	108	Road[1/] Fence Water Rights
Aubert Brothers	125	Road
Reservation	133	Road
Round Knob	152	Road
Bulldraw Common	402	Road
Ute Creek Common	410	Road
Prairie Cyn-Johns Cyn	616	Road
Berry Homestead	702	Road
Dougherty Gulch	714	Road
Dry Fork	715	Road
Rest Rotation		
Thompson-Northeast Creek	148	Road
Coal Gulch-Roan Creek	502	Road
Spears	703	Road
Coon Hollow Common	712	Fence
Lower Roan Creek Common	737	Fence

1. Cultural resource clearance will be required for each project site before construction. The details of this process are contained in appendix 6.

2. Threatened and endangered plant and animal species surveys and clearances will be required for each project site before construction. If an action may adversely affect an officially designated species or its critical habitat, then formal consultation will be initiated with the U.S. Fish and Wildlife Service. This consultation will result in project alteration or abandonment to preclude any adverse effects.

3. Disturbance of soil and vegetation at all project sites will be held to an absolute minimum.

a. Project work will be done when soil moisture conditions are most favorable to minimize compaction and "rutting" to surface soils. Operations will temporarily cease when weather conditions render surface soils more susceptible to damage.

b. Rehabilitation efforts will include water control measures and revegetation. Surface soils will be stockpiled, if feasible, and later used to rehabilitate surface areas. Rehabilitation treatments will continue until successful.

c. The proposed reservoirs, water catchments, pipelines, and roads will be constructed on the most suitable soils, consistent with project requirements. Slope, water table, permeability, depth to bedrock, and susceptibility to erosion are among the factors which will be taken into consideration.

4. Permanent roads or trails will not be constructed to project sites. Existing access and off-road vehicles will be used where needed. There will be no scooping or blading of rights-of-way unless dictated by topography. Land clearing of only the project sites will be allowed except on sites requiring excavation.

5. Sufficient watering of construction sites will be done during construction of range improvement projects to facilitate windblown dust suppression.

6. Proposed range projects will be screened from heavily used roads or sites by utilizing natural topography and vegetation. Fences, however, can be built along roads to facilitate inspection and maintenance.

7. No surface-disturbing activity will be permitted in the Colorado and Dolores River corridors, which are being studied for inclusion in the Wild and Scenic Rivers System, if such activity would impact natural or visual integrity. Table 1-10 shows projects which have been proposed within these areas.

8. All projects will be constructed with the most nonreflective, color coordinated material available so that projects will blend into the natural setting, unless safety considerations demand high visibility.

9. No project will be skylined on a ridge top.

10. All clearings and disturbed areas associated with reservoirs, water catchments, spring developments, wells, pipelines, and fences will be revegetated with vegetation native to the site if possible.

11. When soil is moved, the original contours will be restored as nearly as possible by slope rounding, benching, or other techniques.

12. Pruning or topping of vegetation will be considered if complete removal is not necessary.

13. All projects affecting aquatic or riparian habitat will be reviewed by the District wildlife or fisheries biologist. The project will be altered to reduce adverse impacts to aquatic or riparian habitats.

MAINTENANCE AND INSPECTION PROCEDURES

Policy guidelines for maintenance of range improvements constructed on lands administered by BLM are found in Section 7120 of the BLM Manual (Watershed Management). Existing and new fences, cattleguards, and stock trails built primarily for livestock management would be covered by maintenance agreements with individual licensees. Generally speaking, minor maintenance involving little expense would be the responsibility of the licensee, while reconstruction or major maintenance as a result of floods or other natural calamities would be the responsibility of BLM.

BLM-owned water development improvements, including wells, pipelines, wildlife watering devices, storage tanks, catchments, pit tanks, reservoirs, and springs, would generally be maintained by BLM. Maintenance agreements for these improvements would require the licensee to make periodic inspections and report damage or malfunction to BLM.

BLM would inspect some range improvements. The time for inspection would be based on a predetermined cycle starting from the date of construction. A helicopter would be used to inspect most improvements, and a current inventory of maintenance needs would be provided for the Annual Work Plan. At least 350 to 450 improvements would be inspected annually. Table 1-11 displays the annual maintenance costs expected.

Implementation

Implementation Schedule

The 78 intensive management AMPs would be put into operation over an eight-year period. Table 1-12 shows the planned year-to-year schedule of implementation by allotment. This schedule was developed in conjunction with projected range facility construction. The 88 less intensively managed AMPs and two allotments with eliminated grazing would begin operation the first year.

TABLE 1-10

PROJECTS PROPOSED WITHIN WILD AND SCENIC RIVER STUDY AREAS

River	Allotment	Project	Amount
Colorado			
	Crow Bottom (604)	Fence	0.3 mi.
	Colo-Black River (130a)	Fence	0.5 mi.
	Lost Canyon (154)	Fence	0.5 mi.
	Aubert Brothers (125a)	Stock trail	2.0 mi.
Dolores			
	Dugway (145)	Fence	4.0 mi.
		Pipeline	3.0 mi.
		Well	1 each
	Palisade Flats (401)	Fence	1.75 mi.
		Stock trail	0.6 mi.
		Pipeline	1.8 mi.

TABLE 1-11

ANNUAL MAINTENANCE COSTS

Improvement	No. of Units	Maintenance Rate (% of Initial Cost)	Total Annual Maintenance Costs
Vegetation Manipulation			
Chain & Seed	3,925 Ac.	2	$ 1,846
Brush Beating	3,420 Ac.	2	235
P-J Thinning	2,480 Ac.	2	608
Burning	1,000 AC.	2	160
Water Developments			
Reservoirs	58 ea.	3	1,877
Catchments	7 ea.	2.5	3,240
Spring Developments	34 ea.	4	2,123
Wells	4 ea.	3.5	315
Pipelines	137.7 mi.	2.5	5,011
Other Facilities			
Fences	128.1 mi.	2.5	7,939
Cattleguards	27 ea.	2.5	612
Roads/Trails	8.1 mi.	2	113
Totals			$24,079

NOTE: All improvements have an expected life of 20+ years.

TABLE 1-12

INTENSIVE MANAGEMENT AMP IMPLEMENTATION SCHEDULE

Existing (implementation to be completed)

East Tom's Canyon (106)
Gibbler (301)
Wagon Park (302)
Big Salt (501)
Mt. Garfield (509)
East Salt (602)
Corcoran Wash (704)
Winter Flats (713)

Year 1

South of the Road (105)
Timber Ridge (137)
Coates Creek (161)
Woodring (304)
Dolores River (411)
Hubbard (419)
GML (420)
Bergis North Mesa (424)
Dolores Point (429)
Hamilton (433)
Hunter Wash (504)
Buniger (505)
Lapham Canyon (506)
Mogensen (508)
Badger Wash (601)
Maluy (610)
Burdick/Tater Hills (706)
Whittaker Flats (754)
4A Ind. (755)
Jerry Gulch (847)

Year 2

Whitewater Common (203)
Crow Bottom (604)
Baker-Bitter Creek (612)
Rabbit Valley (613)
Head of Carr Creek (721)
Logan Gulch (733)
Paddock (742)
Upper Brush Mountain (748)
Lower Rapid Connonwood (844)

Year 3

Haystack (103)
Meinhart (150)
Boulder Cyn-Ladder Cyn (157)
North Creek (416)
Logan End (732)
Wild Country (809)

Year 4

Palisade Flats (401)
Wright Draw (405)
Blue Mesa (406)

Year 5

Kannah Creek (202)
Bulldraw (402)
Bull Hill-Maverick (407)
Sinbad Valley (409)
Ute Creek (410)
Coal Gulch-Roan Creek (502)
Garr Mesa (503)
West Salt (603)
Coon Hollow (712)
Lyons-Anderson (811)

Year 6

Little Salt (507)
Berry Homestead (702)
Spears (703)
Brush Mtn. (705)
Rodeo Grounds (710)
Dougherty Gulch (714)
Dry Fork (715)
Lower Roan Creek (737)
Roan Creek (744)

Year 7

Longshore (108)
Fessler (113)
Bangs Canyon (116)
Henderson/4A (723)
Kimball (724)
Aubert Bros. (125)
Reservation (133)
Knowles-Little Dolores (135)
Round Mtn. (745)

Year 8

Spring Creek (115)
Colo-Black Ridge (130)
Three Canyons (141)
Dugway (145)
Thompson-NE Crk (148)
Round Knob (152)
Lost Cyn-Sugar Bench (154)
King (163)
Prairie Canyon (616)
Spring Crk-Coon Crk (807)
White Mtn (808)
Big Park (843)

The AMP implementation schedule was designed by the Resource Area Manager and his staff. The major criteria used were important resource conflicts that could be alleviated by an AMP, high resource values on the AMP, and cooperativeness of the livestock operator. The time frames required for easement acquisition were also a factor in designing the implementation schedule.

Of the eleven existing AMPs that were developed and approved prior to June 1975, full implementation has occurred on three. Insufficient funds for manpower and project construction has prevented full implementation of the remaining eight. Proposed projects on these allotments are included in the analysis covered in this document. Table 1-13 gives a summary of the status of the existing AMPs and what is required before full implementation can be achieved.

Adjustments in stocking levels would be made within 3 years after filing the final ES. If data was not sufficient to support the adjustment, then additional data would be gathered and the adjustment made as soon as funds and manpower became available.

Manpower Requirements

Additional BLM personnel would be required both during and after implementation of the proposed action. It is estimated that an average of about 20 person years of employment would be required annually through the eight-year implementation period and about 12.75 person years annually after implementation. This additional manpower requirement would be for range supervision, survey, design, contract supervision, and maintenance.

Interrelationships with Other Federal and State Programs

BLM Multiple Use Planning

BLM's multiple-use planning system reconciles overlaps and conflicts between different resources, such as livestock grazing and recreation, through extensive study and discussion, including public input. The resulting planning instrument, a management framework plan (MFP), establishes coordinated land use allocations for all resources and establishes objectives and constraints for each resource and support activity.

The ES area is covered by five Management Framework Plans (MFPs). The MFPs and their completion dates are as follows: Mt. Garfield--January, 1971; Roan Creek/Winter Flats--January 1971; Baxter-Douglas/Glade Park--April, 1974; Whitewater--April, 1977; and Grand Junction Resource Area Coal Update--September, 1977. These MFPs may be reviewed at the Grand Junction BLM Office.

The proposed action was synthesized from the objectives and recommendations contained in the MFPs. Since the older MFPs are not as specific as the recent ones, some adjustments and extrapolations of the MFPs were necessary, due to changes in laws, regulations, and policy, in order to develop the proposed action. An example of a recent change is the enactment of the Federal Land Policy and Management Act (FLPMA), with its wilderness study and protection requirements.

Table 1-14 shows a generalized summary of the evolution of the proposed action through the MFP process. The final decisions (MFP-3) and resource tradeoffs formed the basis for the objectives used in the proposed AMPs.

As required in FLPMA, the MFPs would be subject to revisions as regulations, policy, and resource conditions changed. These revisions could result in changes in the proposed action. As changes were proposed, environmental assessments would be conducted to determine if the proposed changes constituted a Federal action significantly affecting the human environment.

Several "Wildland Areas" have been identified in the MFPs that may have wilderness potential (see chapter 2, Wildland Areas). In addition, there is the possibility that other areas may have this potential. An inventory designating wilderness study areas is tentatively scheduled for FY 79/80. Following this, a suitability study would be conducted on all identified wilderness study areas to determine whether they should be recommended to Congress for wilderness designation.

Some of the proposed projects are scheduled for implementation prior to completion of the inventory and suitability study. To preclude unalterably impacting an area's wilderness potential, an environmental assessment record (EAR) addressing the site specific impact upon wilderness character would be completed for each vegetation manipulation and range improvement project prior to implementation. If the EAR showed a given project was not located in an area with wilderness potential or that it would not unalterably impact an area's wilderness potential, the project would be implemented. Otherwise, the project would not be implemented until a final determination of wilderness status was made. Wilderness designation would, in most cases, preclude project implementation if wilderness values would be impacted. Existing facilities could be removed if they intruded upon a designated area's wilderness character.

Grazing in wilderness study areas may continue in the same manner and degree as was allowed on October 21, 1976 in accordance with FLPMA and could also continue in designated wilderness areas if compatible with the protection of wilderness

TABLE 1-13

SUMMARY OF EXISTING INTENSIVE MANAGEMENT AMPS

Allotment Name, No., and System	Number Pastures Proposed	Public Land Acres	Total Qualifications	Improvements Completed	Grazing System In Effect	Interim Grazing System	Cost To Complete Projects	Water Related	Project Livestock Control	Type Vegetation Manipulation
Fish Park (101) - RR	3	3,863	570	yes	yes					
East Tom's Cyn (106) - DR	3	3,788	205	no	no	yes	8,000			1
Davis (201) - RR	3	6,150	655	yes	yes					
Gibbler (301) - RR	6	45,012	4,937	no	no	yes	72,000	3	1	1
Wagon Park (302) - RR	3	31,385	1,397	no	no	yes	85,000	4		
Big Salt (501) - RR	6	25,888	2,621	no	no	no	55,000	6	7	
Mt. Garfield (509) - RR	3	27,250	4,783	no	no	yes	50,000	3	3	
East Salt (602) - RR	5	97,387	15,692	no	no	yes	75,000	3	4	1
Corcoran Wash (704) - RR	5	9,776	1,296	no	no	yes	15,000	1		
Winter Flats (713) - BP	7	27,055	2,505	no	no	yes	80,000	19	11	4
Sunnyside (801) - RR	3	7,403	1,656	yes	yes					

NOTE: RR = rest rotation, DR = deferred rotation, and BP = best pasture.

TABLE 1-14

EVOLUTION OF THE PROPOSED ACTION THROUGH THE MFP PROCESS

Livestock MFP 1	Other Resource MFP 1	MFP 1 Conflicts	MFP 3 1/ Decision	Resource Trade-Offs2/
1. Initiate AMPs (intensive and less intensive)	Minerals			
	A. Lease for coal.	Coal operations could interfere with livestock management.	Approve MFP 1 livestock recommendation.	Possible loss of AUM's due to coal operation.
	Wildlife			
	A. Maintain small openings for Big Game cover.	Reduces potential AUM's for livestock.	Approve MFP 1 wildlife rec.	Loss of potential AUM's for livestock.
	B. Maintain prairie dog population.	Competition for forage. Limits range improvement practices.	Approve MFP 1 wildlife rec.	Loss of small amount of AUM's. Restricts locations of improvement practices.
	C. Maintain vegetative composition on Elk winter range.	Less desirable forage for livestock.	Approve MFP 1 wildlife rec.	Loss of potential AUM's for livestock.
	D. Maintain current livestock use on Elk winter range.	Increase in livestock use not possible.	Approve MFP 1 livestock rec. with needs of elk incorporated in AMP.	None.
	E. Maintain 25% of sagebrush on sagegrouse range as browse species.	Limits potential AUM's for livestock.	Approve MFP 1 wildlife rec.	Loss of potential AUM's for livestock.
	F. Maintain 50% of vegetation on deep winter range as browse species.	Limits conversion of browse to grass for livestock.	Approve MFP 1 wildlife rec.	Loss of potential AUM's for livestock.
	Fisheries			
	A. Limit livestock use to 30% on woody plants.	Loss of livestock AUM's.	Approve MFP 1 livestock rec. with use designed to protect fisheries.	Loss of small amount of AUM's available to livestock.
	B. Reduce livestock use on riparian vegetation.	Loss of livestock AUM's.	Approve MFP 1 fisheries rec. with use designed to protect fisheries.	Loss of small amount of AUM's available to livestock.

TABLE 1-14 (Continued)

EVOLUTION OF THE PROPOSED ACTION THROUGH THE MFP PROCESS

Livestock MFP 1	Other Resource MFP 1	MFP 1 Conflicts	MFP 3 1/ Decision	Resource Trade-Offs2/
	C. Reduce livestock use along Dolores River & Big Dominguez Creek.	Loss of livestock AUM's.	Approve MFP 1 livestock rec. with use designed to protect fisheries.	Loss of small amount of AUM's available to livestock.
	Recreation A. Remove livestock use in seep area for Nokomis Butterfly.	Loss of 1 AUM of livestock use.	Approve MFP 1 recreation recommendation and prepare mgmt. plan for Butterfly.	Loss of 1 AUM of livestock forage.
	B. Permit livestock grazing in "Wildland Areas" while maintaining present character of land.	Could result in restrictions on range improvement.	Approve MFP 1 recreation rec.	Restricts some types, and design of range improvements.
2. Delay spring grazing until range readiness.	None	None	Approve MFP 1 livestock rec.	All resources, except livestock grazing, will benefit. Loss of some livestock AUM's.
3. Eliminate spring grazing on 9 allotments: Unaweep North Side 417 Unaweep South Side 418 South Unaweep 425 North Unaweep 426 Turner Gulch 427 Nelson 428 Beeman 432 Wagon Park 302 Woodring 304	None	None	Approve MFP 1 livestock rec. Mgmt. plans will consider recommendation. Grazing season should consider plant phenology.	All resources benefit. Potential loss of AUM's.
4. Eliminate grazing on Sew-Em-Up allotment (#406 & 412)	Watershed A. Concurrence	None	Approve MFP 1 livestock rec.	All resources benefit, loss of AUM's.
	B. Concurrence			
5. Initiate AMPs (less intensive) on numerous allotments.	Wildlife A. No livestock use after Dec. 1.	Loss of livestock AUMs.	Approve MFP 1 livestock rec.	Mgmt. plans will consider reduction in winter use and protection of water quality & stream flows.
	Fisheries A. Maintain water quality & minimum stream flow.			
6. Chain & seed 71,000 acres of P-J which	Minerals A. Lease for mineral	None	Approve MFP 1 livestock recommendation with	After application of stipulations approximately 4,000 remained to be

TABLE 1-14 (Continued)

EVOLUTION OF THE PROPOSED ACTION THROUGH THE MFP PROCESS

Livestock MFP 1	Other Resource MFP 1	MFP 1 Conflicts	MFP 3 1/ Decision	Resource Trade-Offs 2/
will yield 3,500 AUM's.	development.		stipulations for deer cover, water quality & aesthetics.	treated.
	Wildlife A. Maintain cover for deer on winter range.	Loss of deer cover.		None
	Fisheries A. Maintain water quality & minimum stream flow.	Lower water quality immediately after chaining.		Slight, temporary lowering of water quality.
	Recreation A. Maintain visual quality.	Reduced visual quality.		Visual quality will change but will not be offensive.
7. Obtain legal access to all grazing allotments.	None	None	Approve MFP 1 livestock rec.	Provide public access to public lands.

1/ Rec. = recommendation.

2/ Quantification is generally not possible due to a lack of data.

values as provided for in the Wilderness Act (PL88-577) of 1964.

Other Federal Programs

FOREST SERVICE

The majority of the livestock operators graze their animals on National Forests in the summer. The proposed AMPs have been designed around this use and provide for an even flow of livestock movement to and from National Forests. Generally, the operator grazes the same number of livestock on the public lands as on the National Forest allotments. National Forest grazing use normally extends from June 15 to October 15.

The grazing on the National Forest is a vital part of the year-round operation of a ranch. The Forest provides a high altitude summer pasture that is important for the growth of calves. The quality of this summer feed determines the weight of calves, or yearlings, that are sold in the fall. Most ranchers do not own sufficient land or feed to carry the livestock for the summer months. An even flow is provided for livestock to move from winter feeding on private land to spring grazing on BLM and then to summer grazing in the National Forest. Fall use is provided on BLM and the cycle begins again with winter feeding on private lands.

The management by the Forest Service should be enhanced by the proposed action. No changes in their management are foreseen.

BUREAU OF RECLAMATION

The Bureau of Reclamation (BR) has proposed the Dominguez Dam on the Gunnison River. This dam would inundate a portion of several allotments along the river. However, this project is still in the planning stages; a specific design has not been selected.

If the dam is built, a change in the grazing system may be required due to the loss of use along the river. Increased recreation use could preclude grazing on more acreage. A reduction in use may result, depending on the total amount of forage lost to the project. Wildlife uses would also change, which would affect the amount of forage available for livestock.

FISH AND WILDLIFE SERVICE

Formal consultation was held, according to Section 7 of the Endangered Species Act, concerning the possible impacts of the proposed action on all endangered species and their critical habitat. No impacts were predicted on any species or critical habitat.

State Programs

The Division of Wildlife (DOW) manages wildlife in the state and is vitally interested in the management of livestock because of the direct competition between livestock and some species of wildlife for forage. Coordination between the BLM Wildlife Biologist and the DOW has resulted in wildlife forage allocations which take projected wildlife populations into account. (See the Wildlife section in chapter 3.) These allocations were utilized in the development of the AMPs and this ES.

DOW wildlife management goals and plans have a direct effect on BLM livestock and wildlife habitat management. Close coordination with the DOW has taken place in the development of the wildlife portion of this ES.

CHAPTER 2

CHAPTER 2

DESCRIPTION OF THE ENVIRONMENT

Introduction

The description of the existing environment covers the following sixteen resources or land uses: topography, geology and minerals, climate, vegetation, soils, water resources, wildlife, wild horses, livestock grazing, socioeconomic conditions, visual resources, recreation, wildland areas, wilderness areas, air quality, and cultural resources. The degree of detail in the description of each resource or land use relates to the degree of anticipated impacts.

Topography

The ES area is located on the western slope of the Rocky Mountains and lies entirely within the Colorado Plateau Province. The area consists of broad valleys, flat-topped mesas, steep-walled canyons, and moderately high mountains (figure 2-1). Elevation varies from 4,300 feet in the Colorado River Valley at the Colorado-Utah State line to 10,000 feet on the west end of Grand Mesa.

Geology and Minerals

The ES area is located on the northeast edge of the Colorado Plateau physiographic province. This is an area of valleys, mesas, and plateaus, with the Rocky Mountains to the east and the La Sal Mountains to the west. Uplift has tilted sedimentary rocks to the northeast with a dip of about 3 to 7 degrees northeast. Grand Mesa, which forms the southeast boundary of the ES area, is a large, flat-topped mountain. The Uncompahgre Uplift forms the southwest boundary, while to the northeast are the Grand Hogback monocline and the Piceance Basin.

Exposed formations range from Precambrian in the Colorado National Monument to recent alluvium along drainage areas (see map 2-1). Uplift, faulting, and erosion have created the contrasting elements of flat-topped mesas and plateaus with steep canyons and broad valleys. The relationship of formations near the Colorado National Monument, in the heart of the ES area, is shown in figure 2-2.

Mineral resources in the ES area include uranium, vanadium, oil, natural gas, coal, oil shale, nahcolite, dawsonite, sand and gravel, building stone, decorative rocks, and some pegmatite minerals. Other minerals, such as copper, are no longer produced.

Southwest Mesa County is crossed by the Uravan Mineral Belt of the Colorado Plateau, which is approximately 8 miles wide. Uranium and vanadium are mined in this area. Mineral content of the ore is not uniform, so selective mining is required to attain the desired grade. Underground mining is used. Production occurs in the Morrison Formation.

The primary area for coal development is the Book Cliff field between DeBeque and the Colorado-Utah State line. The impacts of coal mining are discussed in the Drfat West-Central Colorado Coal Environmental Statement.

Oil shale occurs in the Green River Formation. The oil shale is part of the Piceance Basin. Only a small portion of the oil shale occurs in the ES area, and it is of lesser quality than that in other areas.

Sand and gravel are obtained from fluvial or terrace deposits. Occasionally, BLM issues permits for the excavation of sites near rivers and tributaries for these materials. Building stone is gathered from community pits and common-use areas which are open for use by nearby communities.

Climate

Located on the western slope of the Rockies, the ES area has a climate marked by the wide seasonal range typical of interior localities at this latitude. Data is collected from eight climatic stations in the Grand Junction Resource Area: Gateway ISW, Colorado National Monument, Fruita, Grand Junction WSO AP, Palisade, Grand Junction 6ESE, Collbran 2SW, and Altenbern. Together with the two stations just outside the ES area, Grand Valley and Mesa Lakes Resort, they provide adequate coverage. Map 2-2 shows the locations of these stations.

Annual precipitation varies from approximately 25 inches near Douglas Pass and the upper head of Plateau Creek to about 8 inches around Mack and

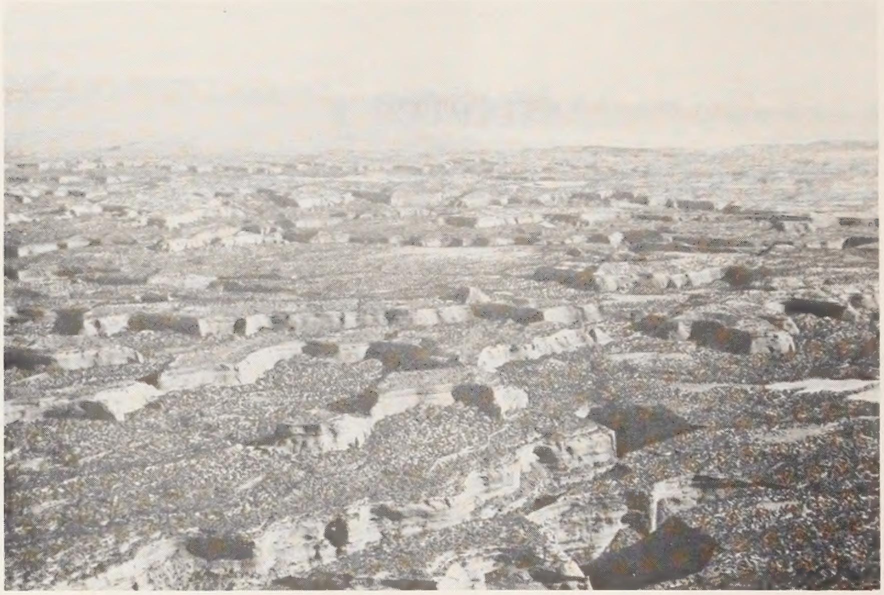
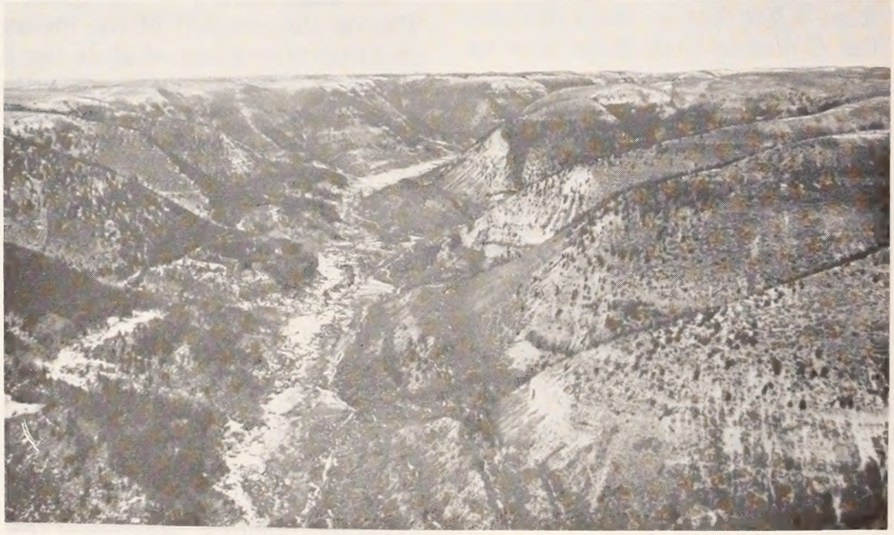
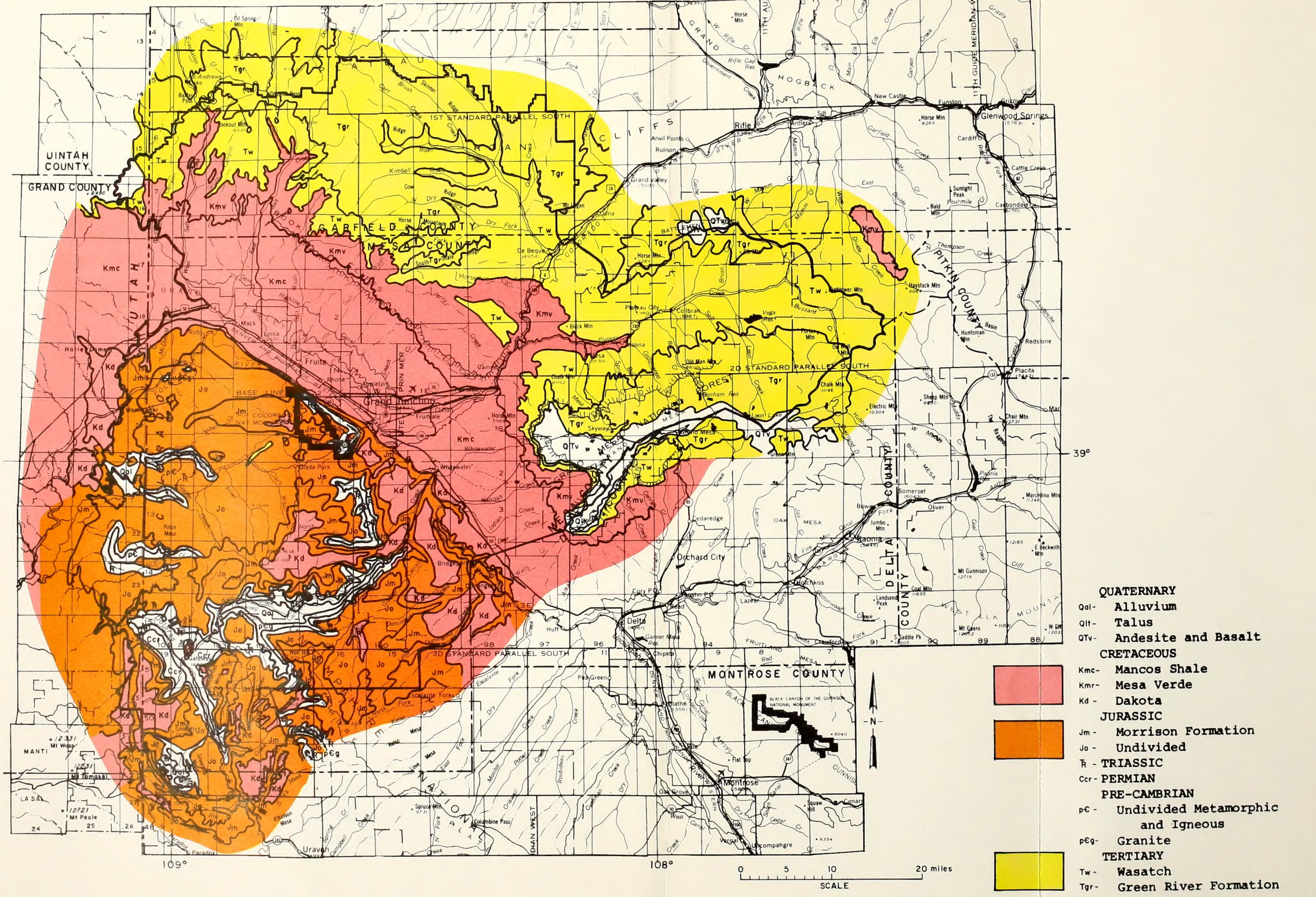


Figure 2-1. Mesa and canyon country over Knowles Canyon. The Grand Valley and the Book Cliffs are in the background. Pinyon pine and juniper woodland is visible.



Roan Creek drainage in the Roan Plateau. This drainage is approximately 2,200 feet in depth.



Map 2-1. Geologic Formations

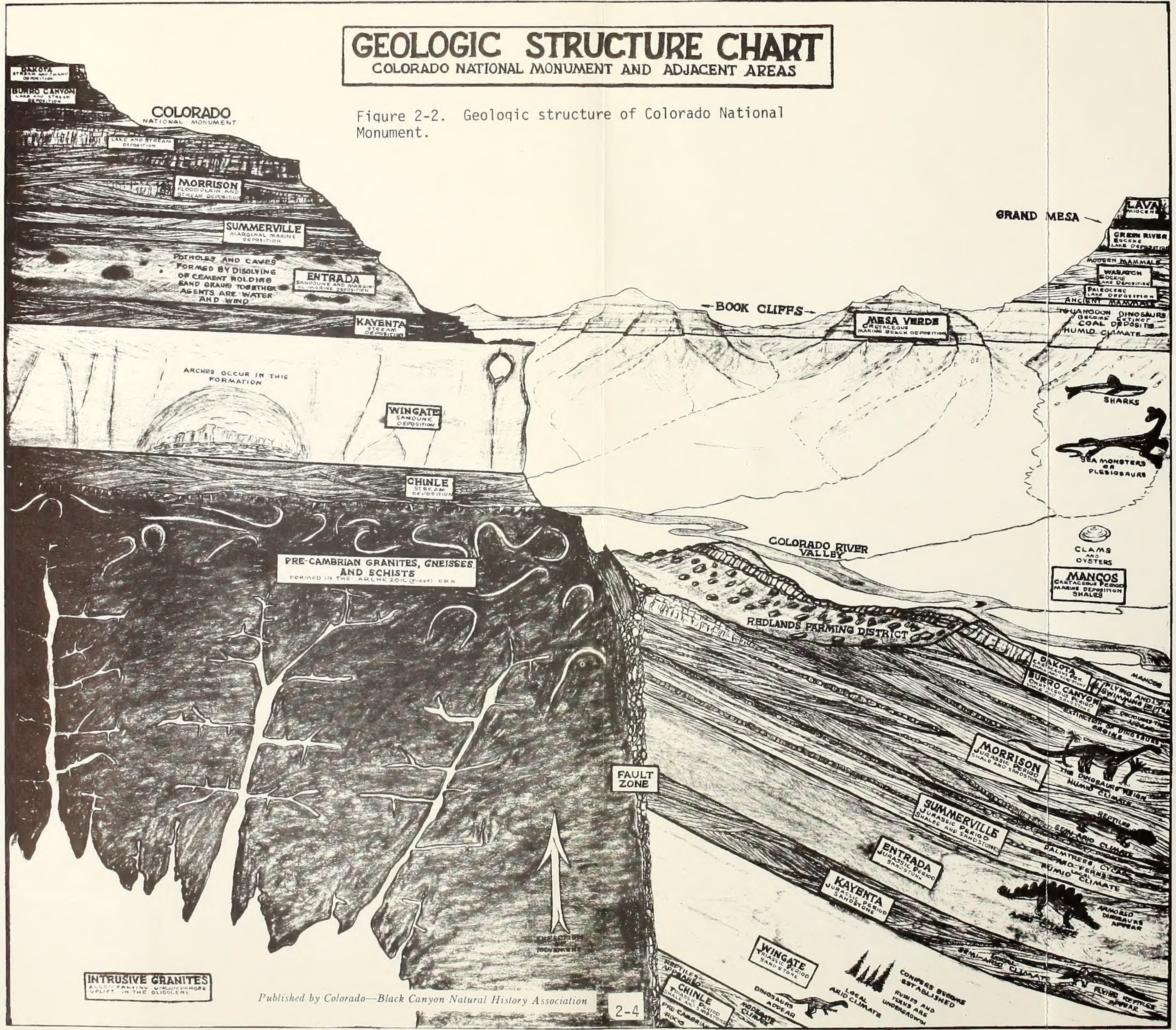

GEOLOGIC STRUCTURE CHART
COLORADO NATIONAL MONUMENT AND ADJACENT AREAS
DAKOTA STREAM AND SWAMP DEPOSITION
BURRO CANYON LAKE AND STREAM DEPOSITION
COLORADO NATIONAL MONUMENT
LAKE AND STREAM DEPOSITION
MORRISON FLOODPLAIN AND STREAM DEPOSITION
SUMMERVILLE MARGINAL MARINE DEPOSITION
POTHOLES AND CAVES FORMED BY DISOLVING OF CEMENT HOLDING SAND GRAINS TOGETHER AGENTS ARE WATER AND WIND
ENTRADA SANDDUNE AND MARGINAL MARINE DEPOSITION
KAYENTA STREAM DEPOSITION
ARCHES OCCUR IN THIS FORMATION
WINGATE SANDUNE DEPOSITION
CHINLE STREAM DEPOSITION
PRE-CAMBRIAN GRANITES, GNEISSES AND SCHISTS FORMED IN THE ARCHEZOIC (FIRST) ERA
DIRECTION OF MOVEMENT
FAULT ZONE
INTRUSIVE GRANITES ACCOMPANYING UNCOMPAHGRE UPLIFT IN THE OLIGOCENE
BOOK CLIFFS
MESA VERDE CRETACEOUS MARINE BEACH DEPOSITION
GRAND MESA
LAVA MIOCENE
GREEN RIVER EOCENE LAKE DEPOSITION
MODERN MAMMALS
WASATCH EOCENE LAKE DEPOSITION
PALEOCENE LAKE DEPOSITION
ANCIENT MAMMALS
IGUANODON DINOSAURS BECOME EXTINCT
COAL DEPOSITS
HUMID CLIMATE
SHARKS
SEA MONSTERS OR PLESIOSAURS
CLAMS AND OYSTERS
MANCOS CRETACEOUS PERIOD MARINE DEPOSITION SHALES
COLORADO RIVER VALLEY
REDLANDS FARMING DISTRICT
MANCOS
DAKOTA CRETACEOUS PER. SHALE AND SANDSTONE
BURRO CANYON CRETACEOUS PERIOD SHALE AND SANDSTONE
FLYING AND SWIMMING REPTILES
EXTINCTION OF DINOSAURS BEGINS
MORRISON JURASSIC PERIOD SHALE AND SANDSTONE
THE DINOSAURS REIGN
HUMID CLIMATE
REPTILES
SEMI-ARID CLIMATE
SUMMERVILLE JURASSIC PERIOD SHALES AND SANDSTONE
PALMTREES, CYCADS AND FERNS
LOCAL HUMID CLIMATE
ENTRADA JURASSIC PERIOD SANDSTONE
KAYENTA JURASSIC PERIOD SANDSTONE
ARMORED DINOSAURS APPEAR
ARID CLIMATE
LOCAL SEMI-ARID CLIMATE
FLYING REPTILES APPEAR
WINGATE TRIASSIC PERIOD SANDSTONE
CONIFERS BECOME ESTABLISHED
RUSHES AND FERNS ARE UNDERGROWTH
LOCAL ARID CLIMATE
DINOSAURS APPEAR
REPTILES APPEARED
CHINLE TRIASSIC PERIOD SHALE AND SANDSTONE
MODERATE CLIMATE
PRE-CAMBRIAN ROCK

Figure 2-2. Geologic structure of Colorado National Monument.

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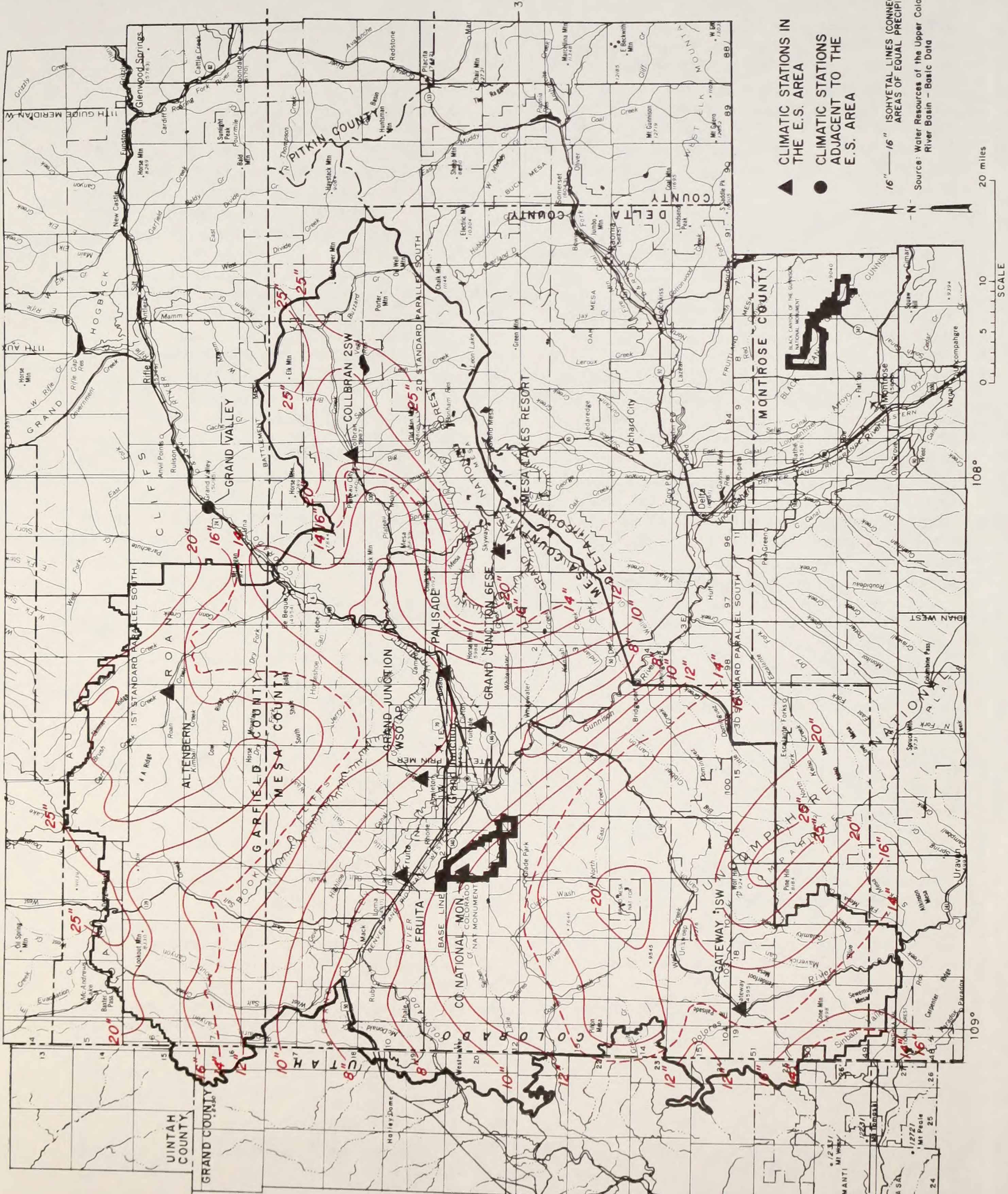


Map 2-2. Isohetal Map and Climatic Stations

Whitewater (see map 2-2). Normally, it is evenly distributed throughout the year. Precipitation occurs predominantly in the form of thunderstorms during late spring, summer, and early fall. There are an average of six thunderstorms in May, four in June, five in July, seven in August, six in September, and five in October. Of these, approximately six percent are high intensity thunderstorms.

Snow can normally be expected between October and April, with the greatest amount falling in January. The mean annual snowfall for Grand Junction is 26.8 inches, with more at higher elevations.

Temperature extremes range from a low of minus 35 degrees Fahrenheit (F) in the winter to 105 degrees F in the summer, but readings of 100 degrees F or higher are infrequent, as are prolonged subzero temperatures. The average annual temperature for Grand Junction is 52 degrees F. January is the coldest month, with an average temperature of 26.6 degrees F, and July the warmest, with an average of 78.7 degrees F.

The growing (frost-free) season throughout the Grand Valley is between 160 and 190 days, with shorter growing seasons at higher elevations. Collbran, at an elevation of 6,000 feet, has a growing season that averages 95 days. As the growing season depends on minimum temperature, this season can vary considerably throughout the area due to local movements of air masses.

Prevailing winds are from the east-southeast at an average of 8 MPH at the Grand Junction Weather Station. However, the strongest winds are usually from the south and southwest and are associated with thunderstorms or prefrontal weather. No data is available on wind velocity and direction for other stations in the ES area.

Vegetation

Introduction

Data used in preparing this section was derived from a 1963 Range Survey, the Phase I Watershed Survey, and ocular reconnaissance survey transects conducted by BLM range conservationists who designed the AMPs. Since the 1963 Range Survey information is over ten years old and did not cover all areas within the ES area, the Phase I Watershed Survey and ocular reconnaissance survey transects gathered from 1973 to 1977 were used to support the 1963 Range Survey data. The base data on vegetation is the most reliable data now available.

Vegetation Types

The following information identifies the fifteen general vegetation types found in the ES area and describes their present condition. Map 2-3 shows the distribution of the vegetation types in the ES area.

PINYON-JUNIPER

The pinyon-juniper vegetation type occupies 600,837 acres (50.0 percent of the public lands). The majority of this type is found between 6,000 and 8,000 feet in elevation, where the annual precipitation ranges from 10 to 16 inches. The pinyon-juniper type is frequently found on foothills, ridges, and mesas, where the terrain is generally rocky and rough (figure 2-3).

The overstory of this type is dominated by Colorado pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*). Pinyon pine are more common on wetter sites, Utah juniper on drier sites. The understory varies with elevation, slope, and aspect.

The lower elevation stands, particularly those with a south facing slope, generally have an understory composed of galleta (*Hilaria jamesii*), Indian ricegrass (*Oryzopsis hymenoides*), needle and thread (*Stipa comata*), bottlebrush squirreltail (*Sitanion hystrix*), Fendler three awn (*Aristida fendleriana*), cheatgrass (*Bromus tectorum*), shadscale (*Atriplex confertifolia*), and black sagebrush (*Artemesia nova*).

The mid-elevation stands of pinyon-juniper generally have an understory composed of Indian ricegrass, cheatgrass, Fendler bluegrass (*Poa fendleriana*), western wheatgrass (*Agropyron smithii*), broom snakeweed (*Gutierrezia sarothrae*), galleta, and big sagebrush (*Artemisia tridentata*).

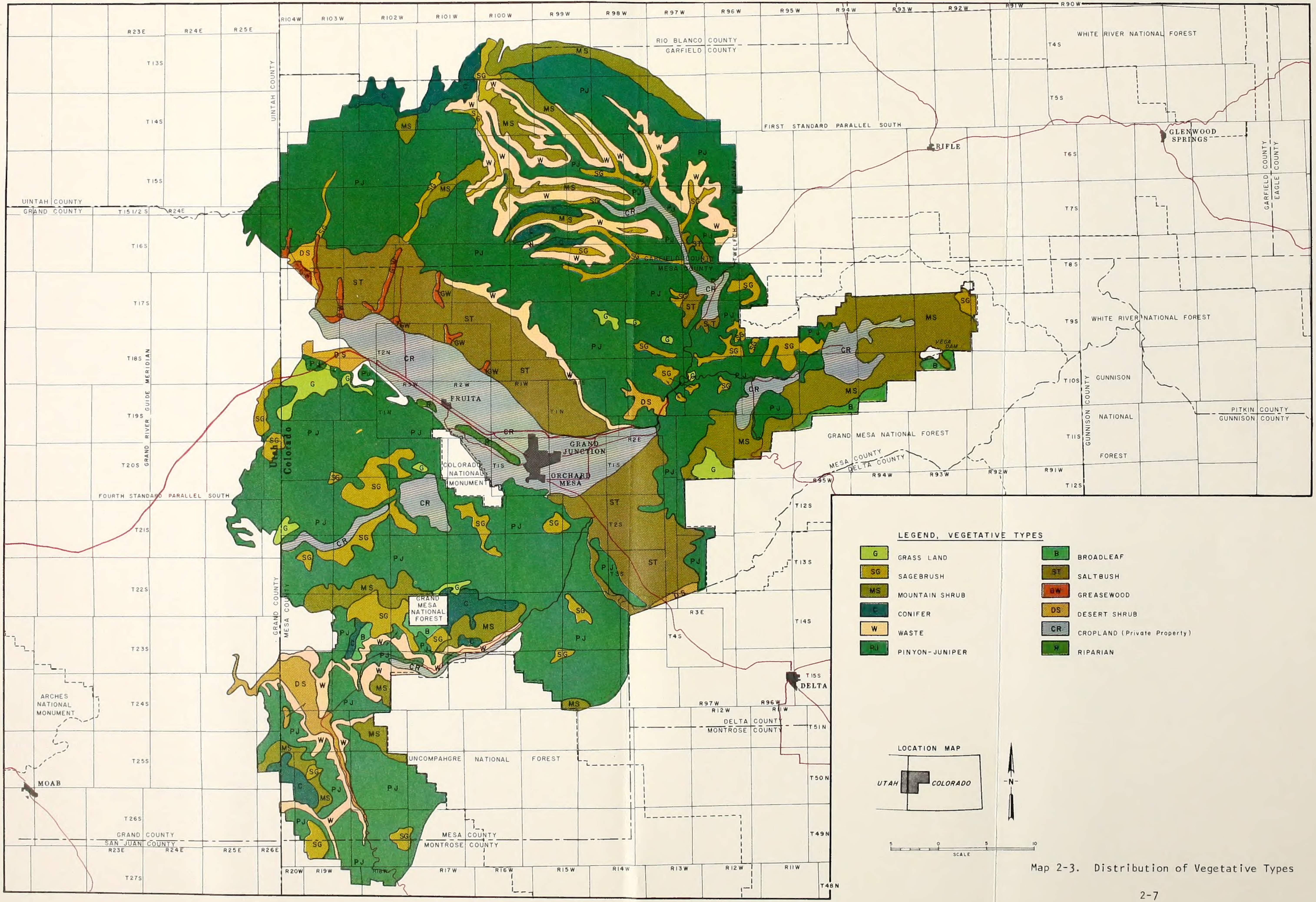
The high elevation stands, especially those with a northerly aspect, have an understory composed of western wheatgrass, Fendler bluegrass, serviceberry (*Amelanchier alnifolia*), mountain mahogany (*Cercocarpus montanus*), antelope bitterbrush (*Purshia tridentata*), and occasional clumps of Gambel oak (*Quercus gambelii*).

In areas which have been chained, the pinyon-juniper understory has shown an increase in grass and shrubs, with crested wheatgrass (*Agropyron cristatum*) being most dominant where it has been introduced as a forage species.

The wide range of environmental conditions in the pinyon-juniper vegetation type produces many types of understory vegetation. All of the above-mentioned species occur in varying quantities and densities, depending on elevation, slope, aspect, and localized soil and climatic conditions. One common forb, goldenweed (*Haplopappus* spp.), occurs throughout all elevations in the pinyon-juniper understory.

MOUNTAIN SHRUB

The mountain shrub vegetation type occupies 148,442 acres (12.4 percent of the public lands) throughout the ES area. It is found between eleva-



Map 2-3. Distribution of Vegetative Types

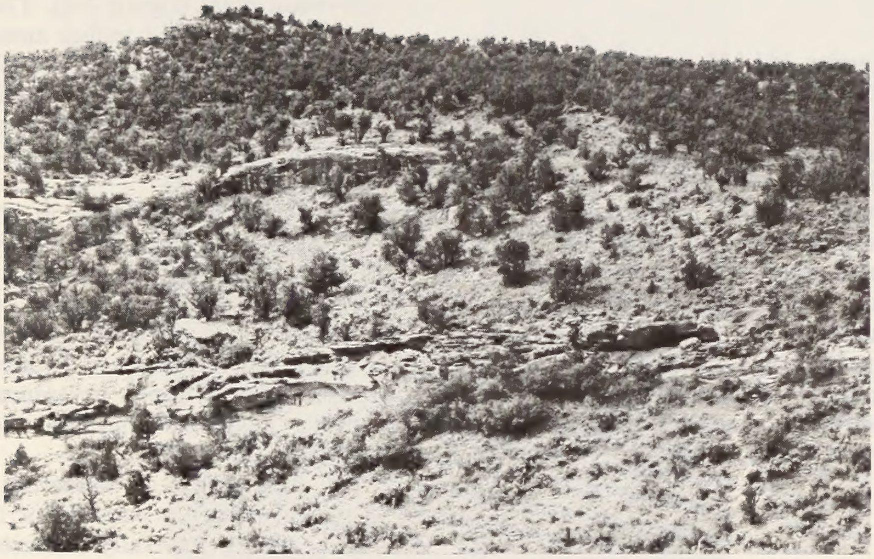


Figure 2-3. Pinyon-juniper vegetation type. Always found on well-drained soils, this type is frequently interrupted by sagebrush openings. West of Collbran, June 29, 1978.

tions of 7,000 and 9,000 feet, where the annual precipitation ranges from 12 to 18 inches. The mountain shrub type grows on all slopes and aspects, and density varies from open stands to dense thickets (figure 2-4).

The overstory is dominated by Gambel oak, serviceberry, and mountain mahogany. The understory varies from western wheatgrass, bluegrass (*Poa* spp.), and big sagebrush in the open stands to western wheatgrass, bluegrass, mountain and nodding bromes (*Bromus marginatus* and *B. anomalus*), and snowberry (*Symphoricarpos* spp.) in the dense thickets.

SALTBUSH

Saltbush occupies 141,333 acres (11.8 percent of the public lands) and is typically located between pinyon-juniper and irrigated croplands of the valleys. It is generally located between 4,000 and 5,000 feet in elevation, where the annual precipitation averages below 10 inches (figure 2-5).

The dominant species are shadscale, Nuttall's saltbush (*Atriplex nuttallii*), and mat saltbush (*A. corrugata*). Other species found in the saltbush type are fourwing saltbush (*A. canescens*), rubber rabbitbrush (*Chrysothamnus nauseosus*), broom snakeweed, galleta, inland saltgrass (*Distichlis stricta*), bottlebrush squirreltail, and cheatgrass. Big sagebrush may be found occasionally along drainages.

SAGEBRUSH

The sagebrush vegetation type occupies 130,852 acres (10.9 percent of the public lands) and is interspersed throughout the same elevation and precipitation ranges as the pinyon-juniper type. Several of the sagebrush areas are quite large, but most of the acreage consists of small parks within the pinyon-juniper vegetative types (figure 2-6). Large sagebrush parks occur at higher elevations among mountain shrub stands.

The dominant species is big sagebrush. It varies in height from 1 to 10 feet, with the average height being 3 feet. The understory is composed of needle and thread, western wheatgrass, Indian ricegrass, galleta, junegrass (*Koeleria cristata*), bottlebrush squirreltail, three awn, and cheatgrass. Shadscale, broom snakeweed, lanceleaf yellowbrush (*Chrysothamnus lanceolatus*), and phlox (*Phlox* spp.) are present in the sagebrush type at lesser population levels. There are also parks of black sagebrush (*Artemisia nova*).

GRASS

The grass vegetation type is found at all elevation levels and covers 38,908 acres (3.2 percent of the public lands) (figure 2-7). Much of the acreage has resulted from areas being cleared of pinyon-juniper or sagebrush and seeded with crested wheatgrass and/or smooth brome.

Dominant grass species are galleta, Columbia needlegrass (*Stipa columbiana*), crested wheatgrass, Colorado wildrye (*Elymus ambiguus*), and smooth brome, depending on the elevation and precipitation range. Other species associated with the grass type vary from Indian ricegrass and bluegrass to broom snakeweed and cheatgrass.

CONIFERS AND BROADLEAFS

The conifer vegetation type occupies 28,771 acres (2.4 percent of the public lands) in the high elevation areas (figure 2-8). These areas usually receive more than 18 inches annual precipitation and are located on steep hillsides and heads of canyons having a northerly aspect. Conifers are often mixed with the broadleaf vegetation type, which occupies 5,221 acres (0.4 percent of the public lands) (figure 2-9).

The dominant species in the conifer type are Douglas fir (*Pseudotsuga menziesii*), Engelmann spruce (*Picea engelmannii*), and alpine fir (*Abies lasiocarpa*), while the broadleaf type is dominated by quaking aspen (*Populus tremuloides*). Understory species include fescues (*Festuca* spp.), bluegrass, sedges (*Carex* spp.), geraniums (*Gerainium* spp.), peavine (*Lathyrus* spp.), snowberry, and rose (*Rosa* spp.).

Small acreages of ponderosa pine (*Pinus ponderosa*) also make up portions of the conifer type, but this species is generally scattered on various sites at lower elevations. Cottonwood (*Populus* spp.) and boxelder (*Acer negundo*) make up portions of the broadleaf type, but these involve small acreages which are generally located along streams.

DESERT SHRUB

The desert shrub vegetation type is found on the more sandy, rocky areas of the valley bottoms (figure 2-10). It occupies 19,269 acres (1.6 percent of public lands) in the 4,500 to 6,500 foot elevation range, where the annual precipitation ranges from 8 to 12 inches.

Species common to this type are shadscale, black sagebrush, black brush (*Coleogyne ramosissima*), green mormon tea (*Ephedra viridis*), groundsel (*Senecio* spp.), prickly pear (*Opuntia* spp.), galleta, blue grama (*Bouteloua gracilis*), three awn, and cheatgrass.

GREASEWOOD

The greasewood vegetation type occupies 16,826 acres (1.4 percent of the public lands). It is found throughout the saltbush type in moist drainages where alkaline soil conditions are present (figure 2-11). Considerable bare ground is associated with greasewood type due to the alkaline soil.

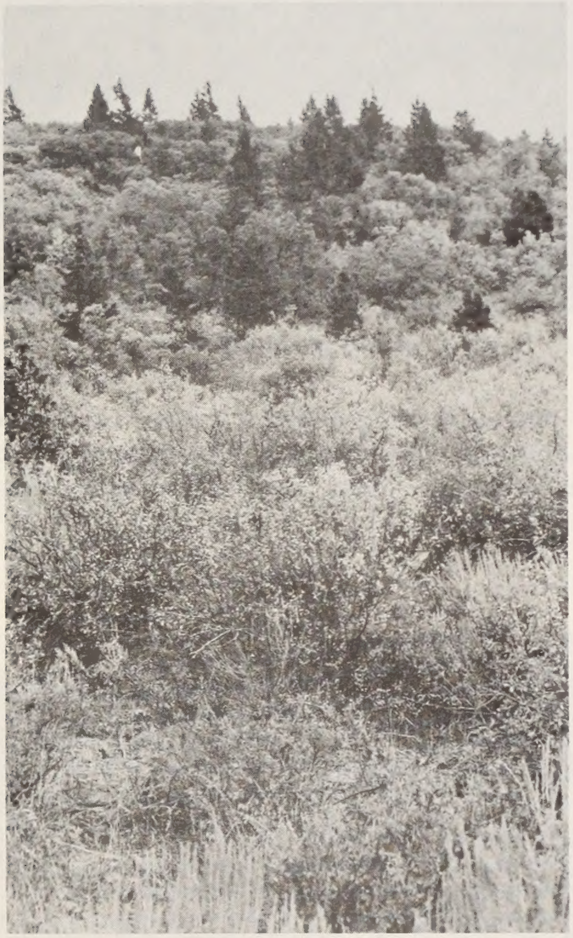


Figure 2-4. Mountain shrub vegetation type. Saskatoon serviceberry is the dominant shrub here. Douglas firs are the conifer trees and big sagebrush is in the immediate foreground. Douglas Pass, September 24, 1978.

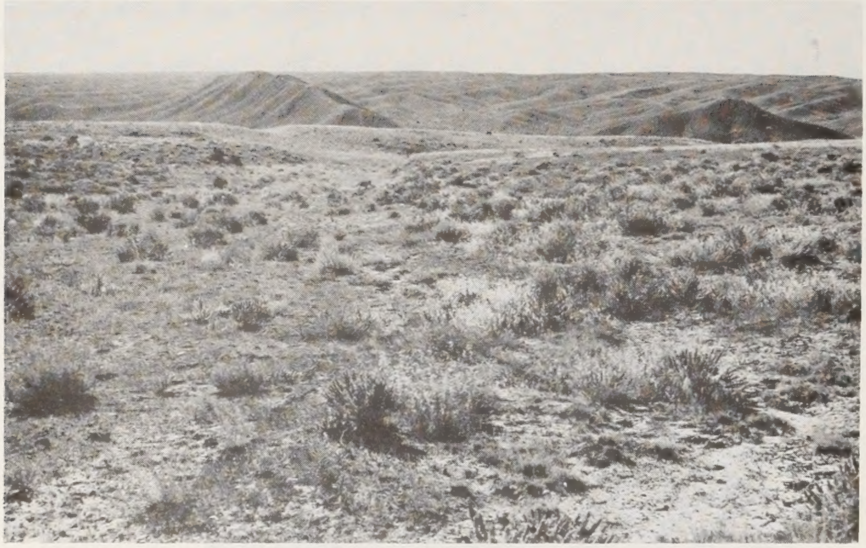


Figure 2-5. Saltbush vegetation type. Shadscale, galleta, cheatgrass, and Indian ricegrass are the notable species here. East Salt Allotment, September 23, 1978.

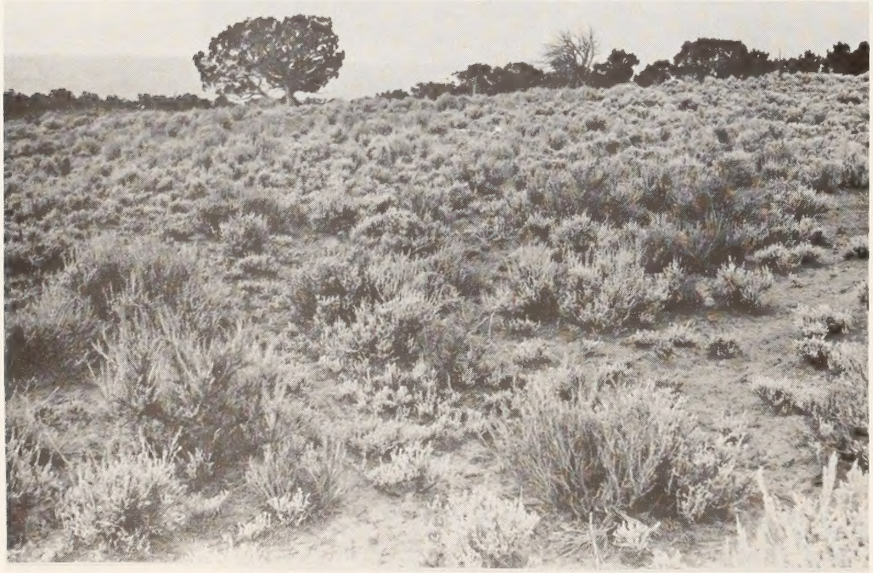


Figure 2-6. Sagebrush vegetation type. Perennial herbs are scarce and range condition on this site is poor. Halfway House Allotment, September 7, 1978.

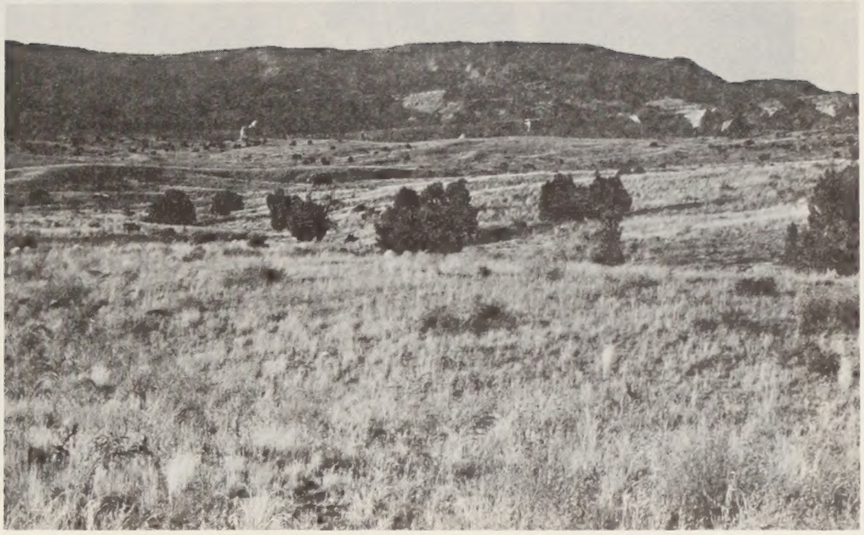


Figure 2-7. Grass vegetation type. Galleta and sand dropseed are the dominant species here. Baker Allotment, September 6, 1978.

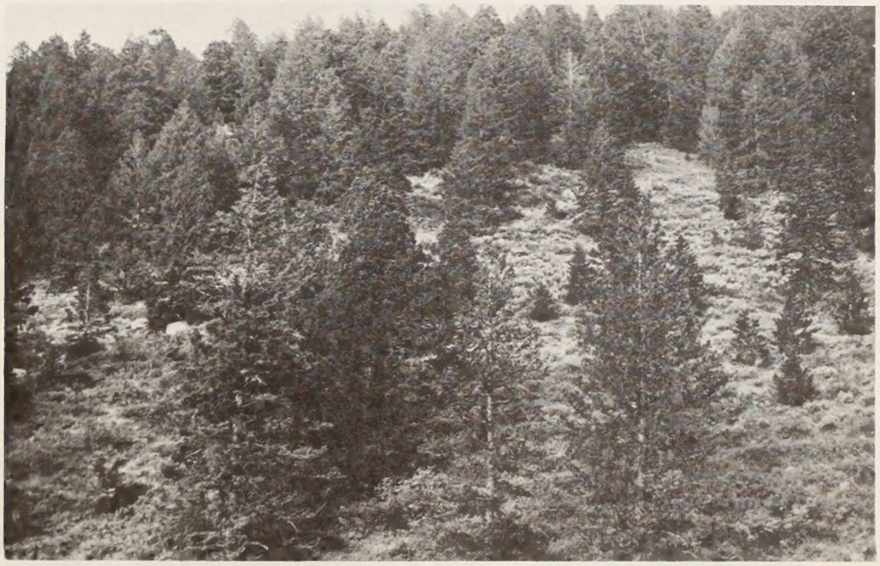


Figure 2-8. Conifer vegetation type. Douglas fir is the dominant tree species. Most of the forage is in such openings as this, with mountain snowberry the dominant shrub. Douglas Pass, September 24, 1978.

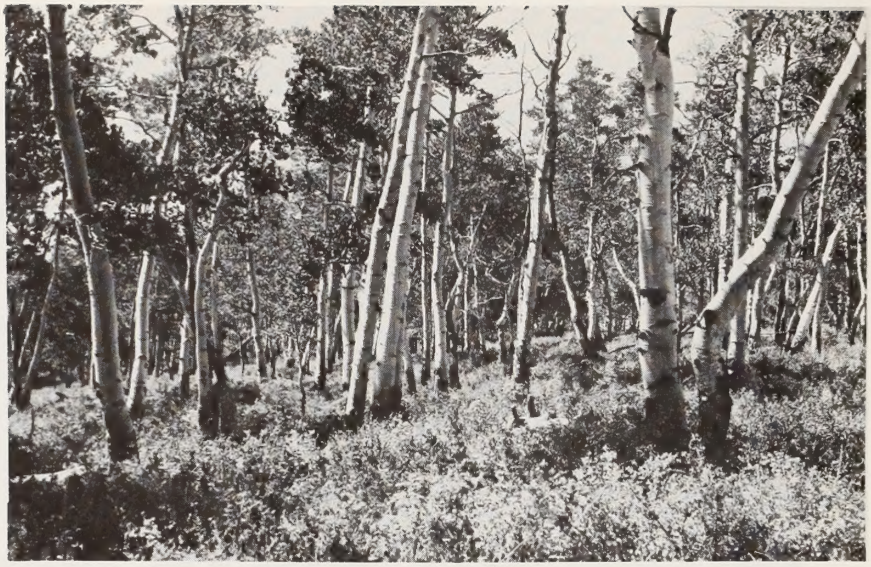


Figure 2-9. Broadleaf tree vegetation type. The aspens shown here represent the most abundant broadleaf tree type in west-central Colorado. Mountain snowberry is the most common understory shrub. Mabie Allotment, August 29, 1978.

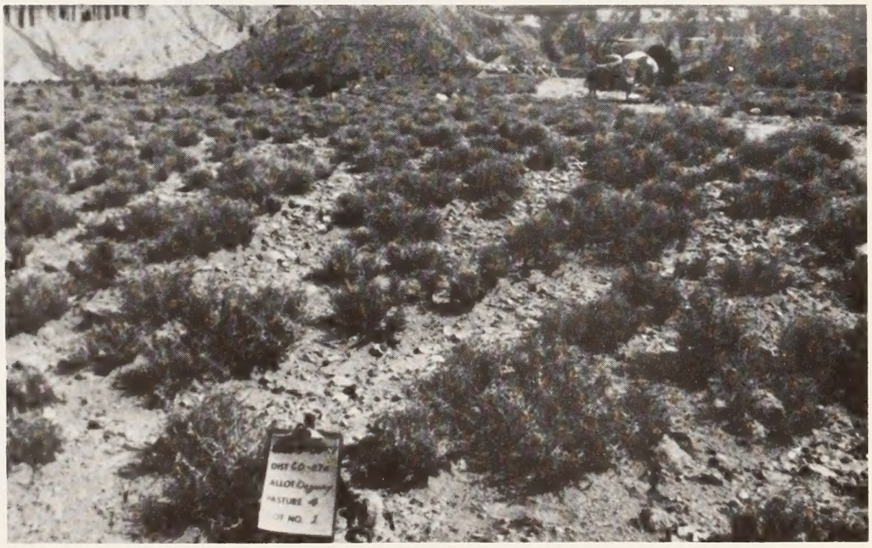


Figure 2-10. Desert shrub vegetation type. Blackbrush is dominant. Blue grama is a common grass species. Dugway Allotment, August 30, 1977.

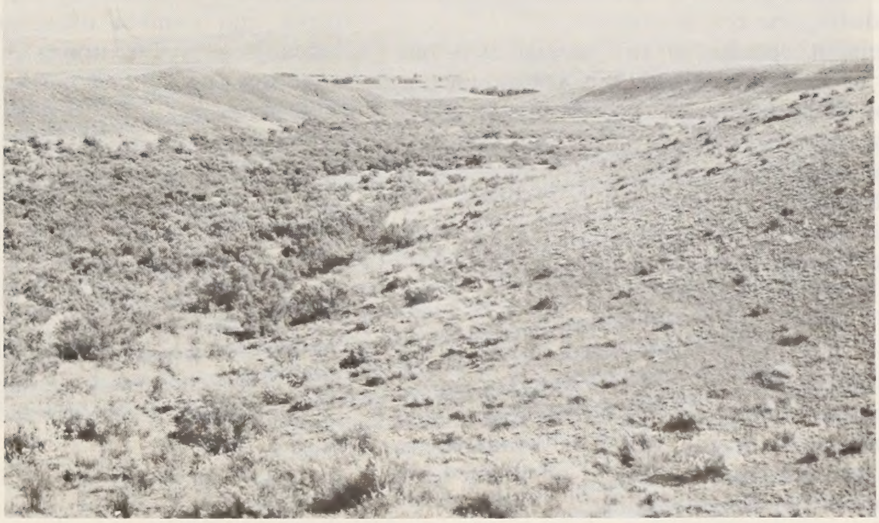


Figure 2-11. Greasewood vegetation type. Here greasewood is on the alluvial valley floor which is flanked by a saltbush/galleta community on the upland. Rabbit Valley Allotment, September 23, 1978.

The dominant species is greasewood (*Sarcobatus vermiculatus*). Other species include opuntia, alkali sacaton (*Sporobolus airoides*), cheatgrass, tamarisk (*Tamarix* spp.), and scattered patches of galleta and saltgrass.

WASTE AND BARREN

Waste and barren type occupies 59,942 acres (5.0 percent of the public lands) throughout the ES area. Waste areas are steep, rocky, and rough; are largely inaccessible to livestock; and will receive little future livestock use. Barren areas have practically no natural vegetation.

ANNUALS, MEADOWS, AND CROPLAND

These three types occupy 5,860 acres (approximately 0.5 percent of the public lands). The annuals occur at various elevations where some surface disturbance of the soil has occurred (figure 2-12). Soil disturbance can occur in sheep or cattle holding areas or as a result of mineral exploration activities. Meadows and croplands are generally located in drainage bottoms where soil moisture remains fairly high during the dry seasons.

The dominant species in the annual type are cheatgrass, bottlebrush squirreltail, and numerous annual forbs, particularly the highly valued filaree (*Erodium cicutarium*). Galleta, shadscale, mat saltbush, and broom snakeweed are also represented in the annual type.

Meadows are dominated by sedges and bluegrass, while croplands are generally composed of introduced vegetation species.

RIPARIAN

The riparian vegetation type is found in or adjacent to annual or perennial streams or other bodies of water where sufficient water is available to maintain its growth (figure 2-13). It occupies 4,596 acres (0.3 percent of the public lands).

The dominant overstory species include Fremont popular (*Populus fremontii* var. *wislizenii*), narrowleaf cottonwood (*Populus angustifolia*), narrowleaf willow (*Salix exigua*), tamarisk, and skunkbush (*Rhus trilobata*). The dominant understory includes common reed (*Phragmites communis*), cattails (*Typha latifolia*), bullrush (*Scirpus* spp.), sedges, rushes (*Juncus* spp.), saltgrass, alkali sacaton (*Sporobolus airoides*), cheatgrass, and many annual forbs.

Range Condition and Trend

Range condition may be best described as the state of health of the range. Analysis of the range condition, though little used during the early years of the development of the science of range management, has become the basis for adjustment of stocking figures and revision of management plans. The basic concept is not a new one; it had been recognized early by F.E. Clements. Sampson in 1919 proposed that the story of range use could be read in the plant cover that was found upon the range since, as he pointed out, continued heavy use results in retrogression of the plant cover (Stoddard, Smith, and Box 1975).

Through analysis of the range condition in the ES area, each vegetative type was classified in good, fair, or poor condition. Map 2-4 gives an overview of range condition in the ES area. Table 2-1 lists the total acreage of public lands occupied by, and acreage by condition classes for, each vegetation type. As this table indicates, approximately 18 percent (216,885 acres) of the public land is presently in good condition, 47 percent (566,403 acres) in fair condition, and 35 percent (417,569 acres) in poor condition. See appendix 3 for details on the methodology used to analyze the present range condition. Appendix 9 details this information according to the vegetation types in each allotment with proposed intensive management AMPs. An even more detailed breakdown of vegetation and condition by soil types, allotments, pastures, and number of acres of public or private lands is available upon request from the Grand Junction District Office.

The observation of range condition over time is expressed as range trend, which can be upward, static, or downward. Determining range trend is difficult because few objective means of assessing trend are available. Little trend information is on record for the ES area. However, analysis of estimates of trend gathered during the development of the AMPs (1976-1977) indicates that the approximate trend could be downward on 42 percent of the ES area, static on 50 percent, and upward on 8 percent. In addition, information on eleven existing AMPs and the Naval Oil Shale Reserve is on record in the Grand Junction District Office.

The record of the nine existing rest rotation AMPs within the ES area is new, subjective, and somewhat variable. Analysis of available photographs and range condition and trend data on the three fully implemented AMPS indicates that range condition is fair and trend is up on Fish Park (101) and Davis (201), while Sunnyside Common (801) is in poor condition with a static trend.

Of the five partially implemented rest rotation AMPs, Gibbler Common (301) and Wagon Park Common (302) are showing an improvement in their present fair condition, with trend being upward. The three remaining partially implemented allotments, Mt. Garfield Common (509), East Salt (602), and Corcoran Wash (704), have not shown any improvement from their present fair condition; their range trend remains static. It is felt that full implementation of these AMPs would be necessary before an improvement would occur on these three

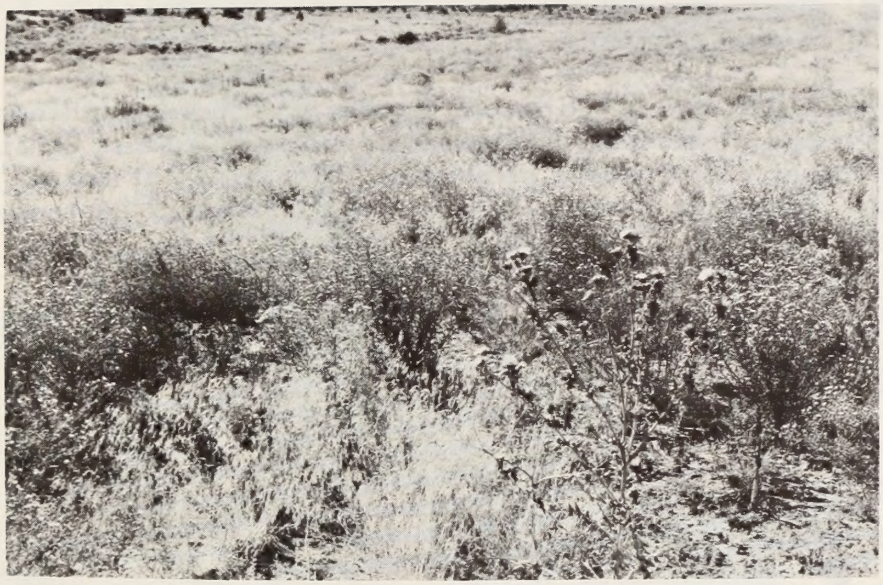


Figure 2-12. Annual vegetation type. Russian thistle, cheatgrass, musk thistle, and other composites are common species here. Glade Park, August 29, 1978.

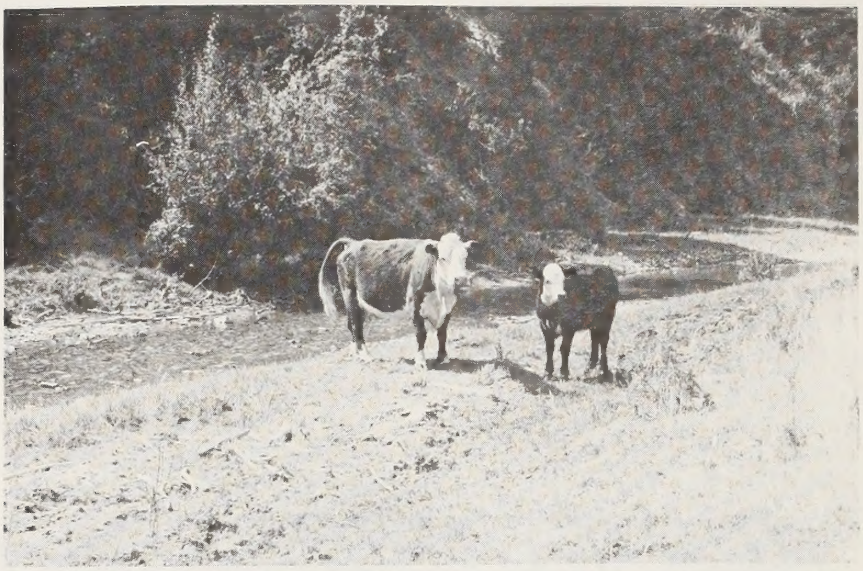
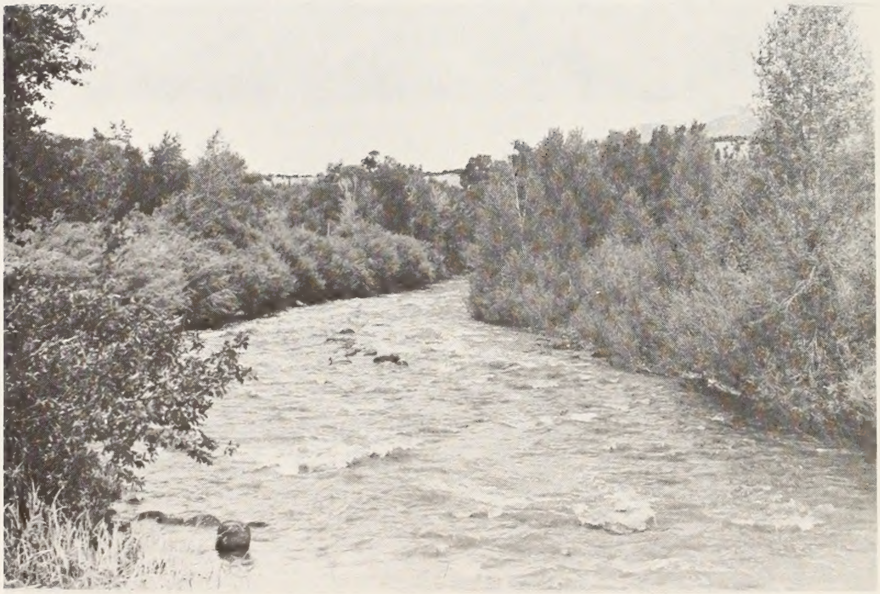
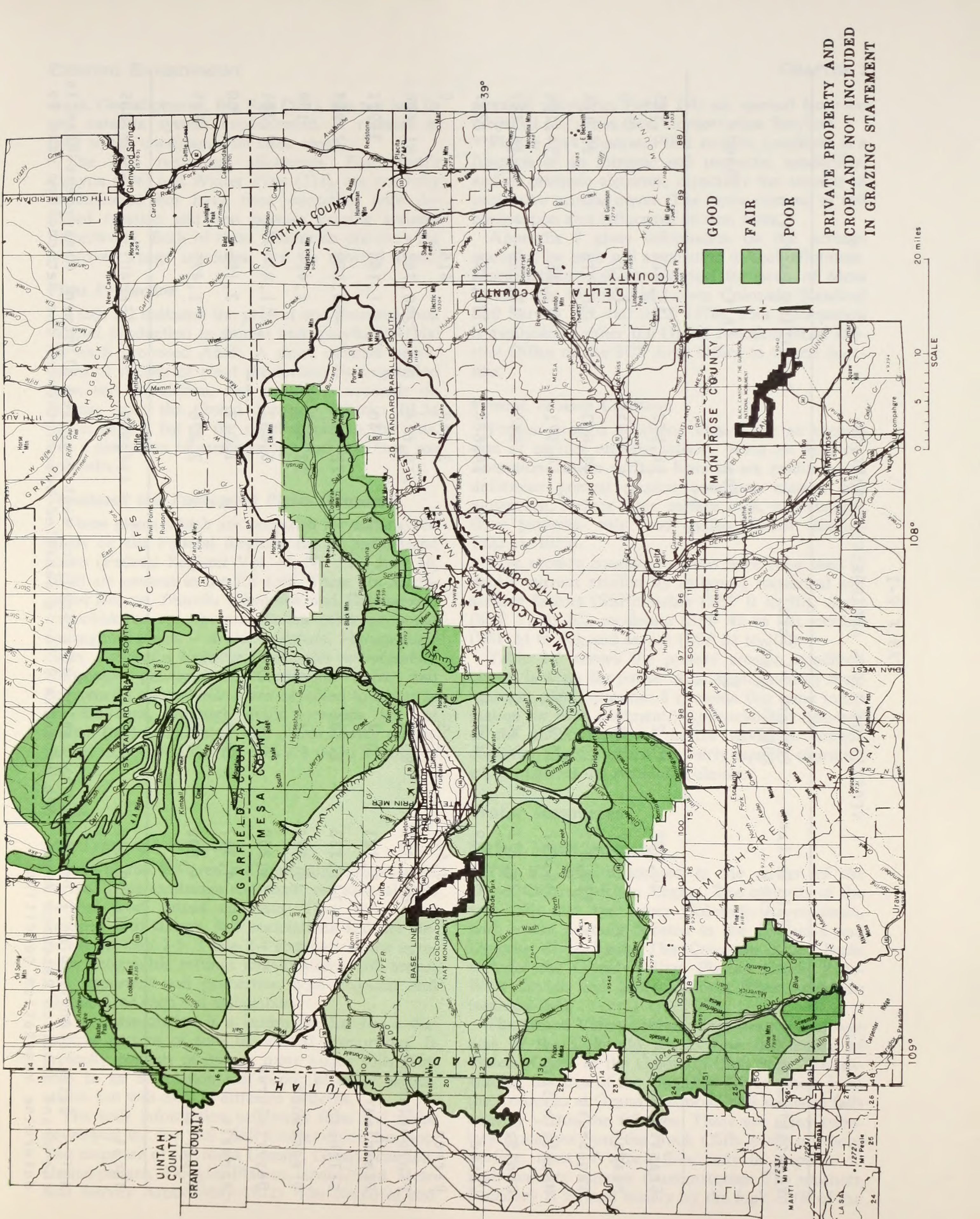


Figure 2-13. Riparian vegetation type. Cutthroat trout exist in this stream. Riparian plants remain but are severely pruned due to the lack of annual rest from grazing. Roan Creek Allotment, September 7, 1978.



Riparian vegetation type. Willows and common reeds indicate a vigorous riparian plant community. Plateau Creek, June 29, 1978.



Map 2-4. Range Condition

TABLE 2-1

VEGETATION TYPES AND FORAGE CONDITION

Vegetation Type	Public Land Acres	Percent of Total Public Lands	Condition (acres)		
			Poor	Fair	Good
Grassland	38,908	3.2	11,570	18,823	8,515
Meadow	1,317	0.1	105	1,212	0
Sagebrush	130,852	10.9	49,603	56,073	25,176
Mountain Shrub	148,442	12.4	14,571	79,765	54,106
Conifer	28,771	2.4	549	13,080	15,412
Waste	56,279	4.7	24,888	29,154	2,237
Barren	3,663	0.3	3,048	615	0
Pinyon-Juniper	600,837	50.0	218,614	290,783	91,440
Broadleaf	5,521	0.4	140	1,160	3,911
Saltbush	141,333	11.8	72,840	55,589	12,904
Greasewood	16,826	1.4	12,331	4,406	109
Desert Shrub	19,269	1.6	5,832	11,076	2,361
Annuals	4,317	0.4	1,072	3,185	60
Riparian	4,596	0.3	2,276	1,475	845
Total	1,200,857	100	417,569	566,403	216,885

NOTE: Data taken from soil productivity tables developed for each proposed Allotment Management Plan in the Grand Junction Resource Area. See appendix 3 for a detailed description of the methodology used to determine vegetation condition.

areas. One allotment, Big Salt (501), has not had its rest rotation system implemented. It remains in poor to fair condition with static trend.

The two remaining allotments, East Tom's Canyon (106) and Winter Flats (713), are not fully implemented but have been operating with deferred rotation and best pasture grazing systems respectively. Both of these allotments are showing improved range condition and an upward trend.

Plant Production

Table 2-2 indicates the present and potential total vegetal production in animal unit months (AUMs) for each proposed AMP. A more detailed breakdown of AUMs of plant production by vegetation type, soil association, and pasture is available on request from the Grand Junction District BLM office, as is a list of the plant species in the area. For a discussion of methodology and data base, see appendix 3.

Threatened and Endangered Plants (Proposed)

Three plants which are proposed for endangered status on the Federal Register list of endangered plants (Federal Register Vol. 41, No. 117, June 16, 1976) are present in the ES area. These are *Sclerocactus glaucus, Phacelia submutica*, and *Echinocereus triglochidiatus* var. *inermis*. Seven other proposed endangered plants -- *Arabis oxylobula, Festuca dasyclada, Astragalus linifolius, Astragalus microcymbus, Eriogonum pelinophilum, Cryptantha apert*, and *Sclerocactus mesae-verde* -- are expected to occur in the ES area, although exact locations are not known (table 2-3). Other rare plants known or suspected to occur in the ES area are listed in table 2-3.

Soils

Soil Types and Properties

Soils in the ES area are generally residual soils derived from sandstone and shale and alluvial soils derived from mixed alluvium. They have been grouped into sixteen soil associations and are depicted on map 2-5. Table 2-4 summarizes the acreages, geographic settings and locations, soil series, and important soil properties, both physical and chemical, of each soil association.

A soil association is a landscape that has a distinctive pattern of soils in defined proportions. It typically consists of one or more major soils. The soils in an association can occur in other associations, but will exist in different patterns.

The soils information originates from soil maps developed by the U.S. Soil Conservation Service. The maps are of the Mesa County, Grand Junction, Uncompahgre, Douglas-Plateau, and Grand Mesa Soil Survey Areas (May 1972). The chemical and physical properties (table 2-4) are quoted from established soil series (Soil Conservation Service).

Figure 2-14 illustrates that erosion condition is a function of an intrinsic soil property, erodibility, and of extrinsic elements, especially the amount of protective ground cover. The biotic element of soil compaction also influences erosion rates.

Appendix 8 gives information on the acreage occupied by each soil association in each allotment. More detailed soil survey data for parts of Mesa County can be found in Lower Colorado Standard Soil Survey No. 180 (SCS 1978). This information is available at either the Grand Junction BLM District Office or the SCS Area Office in Grand Junction.

Present Erosion Condition

Present erosion condition classes are an expression of current erosion activity based on field examination. Seven surface features are evaluated to determine present erosion condition classes: soil movement, surface litter, surface rock, pedestalling, flow patterns, rills, and gullies (BLM Manual 7322.11, 1973).

Five erosion condition classes have been used to depict current erosion by assigning numerical soil surface factors (SSF): stable (SSF 0 to 20), slight (SSF 21 to 40), moderate (SSF 41 to 60), critical (SSF 61 to 80), and severe (SSF 81 to 100).

Table 2-5 shows the present erosion condition classes in acres for public lands aggregated by management plan (appendix 8 presents this same information for each allotment.) Approximately one-half of the public lands are in the moderate erosion condition class; the rest are fairly equally distributed throughout the remaining classes.

Water Resources

Surface Water Resources

The ES area is located in the center of the Upper Colorado River Region. The majority of the area falls into the upper Colorado River Basin, with minor portions located in the Gunnison and Dolores River basin. The Colorado River Basin includes the Grand Valley, Plateau Creek, Rifle-West Divide and Little Dolores River subbasins (see map 2-6).

The Grand Valley subbasin includes the drainage area of the Colorado River from the mouth of Plateau Creek to the Colorado-Utah State line, excluding the area of the Gunnison River which joins the Colorado at Grand Junction. This subbasin falls entirely within the ES area. There are many tributary drainages from the Book Cliffs in the northern portion, most of which flow only in response to high intensity summer thunderstorms. The southern boundary is formed mainly by the high cliffs of the

TABLE 2-2

FORAGE PRODUCTION DATA FOR AMP (INTENSIVE) AREAS

No.	Allotment[1/]	Present Production (AUMs)[2/]	Total Potential Production (AUMs)[3/]
Deferred Rotation			
103	Haystack	57	938
105	South of the Road	30	280
106	East Toms Canyon(E)	205	652
108	Longshore	298	1011
113	Fessler	38	201
115	Spring Creek	603	1545
125	Aubert Brothers	2561	7224
130	Colorado/Black Ridge	1635	3549
133	Reservation	396	611
135	Knowles/Little Dolores	824	1351
137	Timber Ridge	595	764
145	Dugway	331	1955
152	Round Knob	327	899
154	Lost Canyon	2168	6330
161	Coates Creek	22	57
163	King(P)	166	580
203	Whitewater	2569	6078
304	Woodring	256	964
402	Bull Draw	138	320
405	Wright Draw	307	689
406	Blue Mesa	1099	8395
407	Bull Hill-Maverick	553	2198
409	Sinbad Valley	641	1851
410	Ute Creek	464	1234
411	Dolores River	103	356
416	North Creek	257	1221
419	Hubbard	2859	5732
420	GML	129	324

TABLE 2-2 (Continued)

FORAGE PRODUCTION DATA
FOR AMP (INTENSIVE) AREAS

No.	Allotment[1/]	Present Production (AUMs)[2/]	Total Potential Production (AUMs)[3/]
Deferred Rotation			
424	Bergis N. Mesa	464	1615
429	Dolores Point	910	1131
433	Hamilton	56	77
502	Coal Gulch-Roan Creek (R)	1383	3023
503	Garr Mesa et. al.	2439	8569
505	Buniger	160	313
506	Lapham Canyon	276	820
508	Mogenson	125	423
603	West Salt	2949	16313
604	Crow Bottom	211	738
612	Baker-Bitter Creek	1570	4276
616	Prairie Canyon	3552	3655
702	Berry Homestead	347	766
705	Brush Mountain	1221	2078
706	Burdick E. of Ranch	700	876
714	Dougherty Gulch	402	1286
715	Dry Fork	1120	2168
721	Head of Carr Creek	440	1322
732	Logan End Common	363	1094
733	Logan Gulch	553	1719
742	Paddock	272	387
748	Upper Brush Mountain	580	964
754	Whittaker Flats	624	2122
755	4A Individual	79	85
807	Spring Creek	1230	3405
808	White Mountain	762	2342
809	Wild Country	1020	4165
811	Lyons-Anderson	351	773
843	Big Park	806	2545
844	Lower Rapid/Cottonwood	917	1510
847	Jerry Gulch	217	518
	Total	45,730	128,387
Rest Rotation			
101	Fish Park(E)	570	824
116	Bangs Canyon	5423	11487

TABLE 2-2 (Continued)

FORAGE PRODUCTION DATA
FOR AMP (INTENSIVE) AREAS

No.	Allotment[1]	Present Production (AUMs)[2]	Total Potential Production (AUMs)[3]
Deferred Rotation			
	GRAND TOTAL	103,124	311,615

NOTE: Present production data is based on Grand Junction BLM Resource Area unit resource analyses and AMPs. For a discussion of the methodology and data base used in determining current production levels and potential production, refer to appendix 3. Those areas already under an AMP(E) were considered to be properly stocked at the time the AMP was developed. Present capacity estimates will be updated and included in the final ES. Production will vary from year to year, depending on precipitation; the figures given are estimated averages.

[1] (E) = existing AMP, (R) = allotment has other production on areas proposed for rest rotation grazing, and (D) = allotment has other production on areas proposed for deferred rotation grazing.

[2] AUMs of utilizable livestock forage under proper use.

[3] AUMs of total current annual vegetative forage production at 40 percent utilization (1800 lb./AUM).

TABLE 2-3
RARE PLANTS RELATED TO THE ES AREA

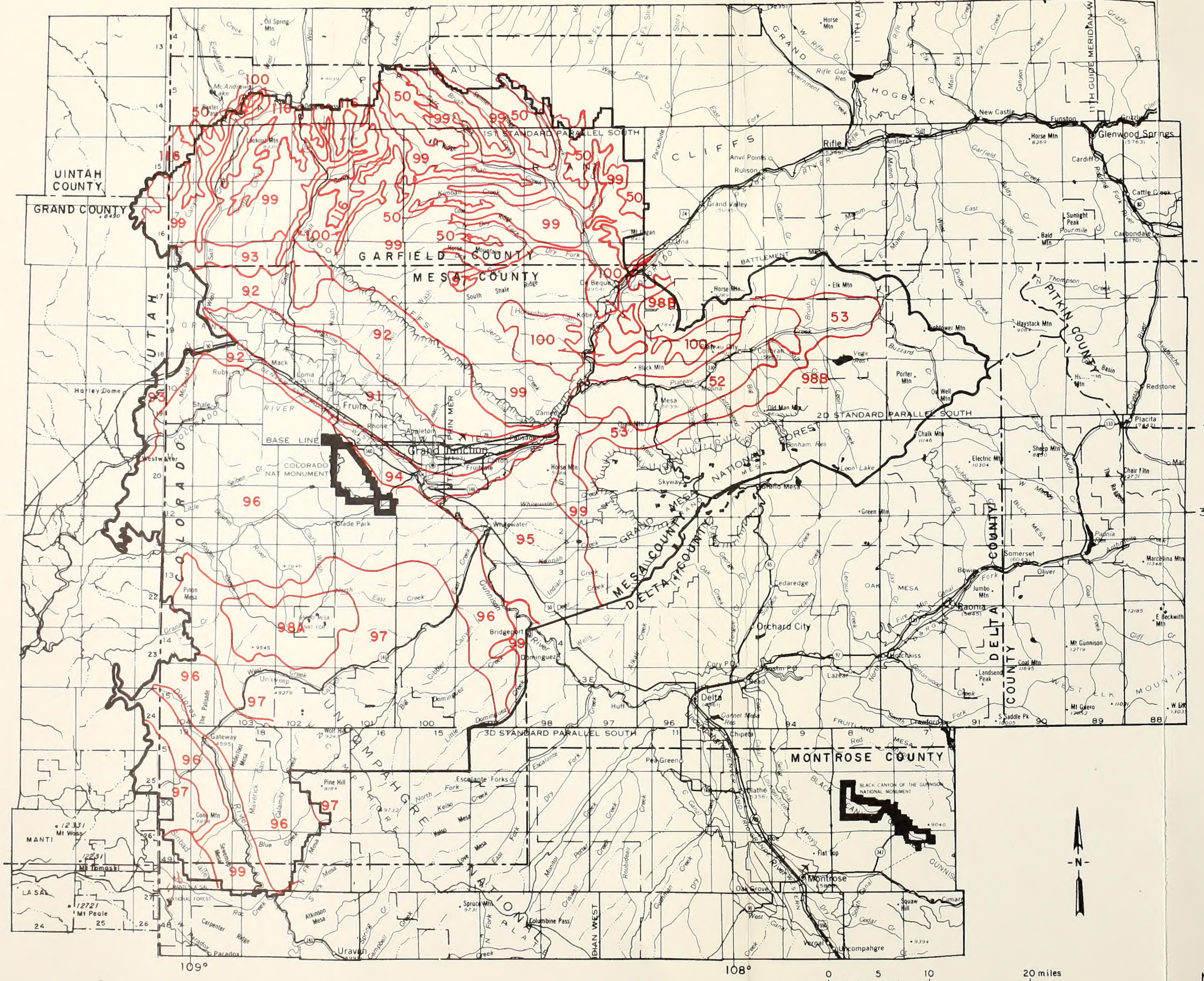
Status[1/]	Family	Species	Common Name	Present on Public Land[2/]	Site Locality	Habitat
Endangered	Brassicaceae	Arabis oxylobula	Rockcress	S	Mountains Garfield Co./record 6300 ft.	
Endangered	Cactaceae	Sclerocactus glaucus	Hedgehog cactus/Barrel cactus	K	Coon Hollow near DeBeque, Dolores River/Gateway to Uravan	Dry, sandy ground; grows in grassy areas & near large old junipers
Endangered	Fabaceae	Astragalus linifolius	Milkvetch	S	Possibly extinct; date last collected, 1926, Grand Valley	
Endangered	Fabaceae	Astragalus microcymbus	Vetch; Milkvetch	S	Gunnison River Valley, W. Colorado	
Endangered	Polygonaceae	Eriogonum pelinophilum	Wild buckwheat	S	Grand Valley	
Threatened	Boraginaceae	Cryptantha elata	Cliffdweller's candlestick	K	Grand Valley - 7 miles north & 2 miles west of Fruita; east of Whitewater Speedway.	Dry ground; grows on bare clay hills of the Mancos Formation
Endangered	Cactaceae	Sclerocactus mesae-verdae	Hedgehog cactus Barrel cactus	S	Southwestern Colorado	Dry slopes
Endangered	Hydrophrophyllaceae	Phacelia submutica		K	East edge of DeBeque just north of old road junction with new highway	Seleniferous knolls
Undetermined	Scorphulariaceae	Mimulus eastwoodiae	Monkey flower	K	Found in Escalante Canyon and suspected in Dominguez and Gibbler Canyons, found in the canyon between Gateway and Uravan along the Dolores River	Located in hanging gardens on cliffs of wingate formation; shallow caves at the base of steep canyon walls
Undetermined	Rosaceace	Rubus exrubricundus		K	Unaweep Canyon	
Undetermined	Pteridaceae	Adiantum capillus veneris	Venus-hair fern	K	Spring in Dolores Canyon south of Gateway	

TABLE 2-3 (Continued)
RARE PLANTS RELATED TO THE ES AREA

Status1/	Family	Species	Common Name	Present on Public Land2/	Site Locality	Habitat
Endangered	Poaceae	Festuca dasyclada	Fescure Grass	K	Garfield County	Rocky slopes
Undetermined	Compositae	Townsendia annua		K	Sinbad Valley	Gypsum endemic
Undetermined	Boraginaceae	Cryptantha osterhoutii		S	Grand Valley, Colorado National Monument	
Undetermined	Boraginaceae	Cryptantha paradoxa		S	Expected in Bridgeport area, Gunnison River Canyon	
Undetermined	Compositae	Chamaechaenactis scaposa	Dwarf chaenactis	S	Grand Valley	
Endangered	Boraginaceae	Cryptantha aperta		S	Grand Valley	Last specimen collected 6/17/1892, clay soils 4,000 - 5,000 ft
Undetermined	Leguminosae	Trifolium macilentum	Clover	S		Grand Valley west Colorado adjacent to Utah
Undetermined	Scrophulariaceae	Penstemon cyanocaulis	Beardtongue	S	Grand Valley	
Undetermined	Umbelliferae	Lomatium eastwoodiae	Biscuitroot	S	Colorado National Monument, possible Unaweep Canyon	Hillsides, mostly in brush
Undetermined	Asclepiadaceae	Asclepias cryptoceras	Milkweed	S	Colorado National Monument	
Endangered	Cactaceae	Echinocereus triglochidiatus var. inermis	Spineless hedgehog	K	Unaweep Canyon	Grows most frequently beneath Pinyon Pine in the black acid pine duff which accumulates at the base of each tree; seldom found in full sun
Threatened	Saxifragaeae	Sullivantia purpusii	Sullivantia	S	North side of Grand Mesa	Wet rocks, west-central and southwestern Colorado

1/ Inclusion of undetermined species suggested by Dr. Webber, University of colorado.

2/ K = known to occur; S = suspected to occur.



MAP SYMBOL	SOIL MAPPIMG UNITS
50	Parachute - Roan - Northwater - Irigul - Silas
52	Pennisula - Collbran - Scholle - Dominguez
53	Jerry - Cochetopa -Scholle
58	Glenburg - Rock Outcrops
91	Billings - Ravola
92	Chipeta - Persayo - Fruita - Billings - Badlands
93	Fruita - Avalon - Mack -Persayo
94	Mesa - Redland - Thoroughfare
95	Utaline - Nelman - Lazear - Blackston - Avalon
96	Palma - Potts - Batterson - Loma
97	Owen Creek - Miracle - Skyway
98A	Mayflower - Cebone - Bangston - Gateway
98B	Bucklon - Inchau - Cochetopa - Jerry - Dollard
99	Veatch - Castner - Rock Outcrops
100	Arvada - Haverson - Heldt - Scholle - Nihill
116	Parachute - Roan - Irigul - Castner

Map 2-5. Soil Associations

TABLE 2-4

SUMMARY OF PHYSICAL AND CHEMICAL SOIL CHARACTERISTICS

Mapping Unit No.	Acres	Percent of ES Area (Includes All Lands) of ES Area	Geographic Setting	Distribution Within ES Area	Soil Series[1]	Parent Material[2]	Soil Depth[3] (inches)	Soil Drainage[4]	Surface[5] Soil Texture	Subsoil[5] Texture	Reaction[6] (pH)	Permeability[7] (inches/hour)	Surface Runoff[8]	Soil Erodibility (K Factor) of Surface Soil[9]	Potential Plant Productivity (pounds/acre, dry wt.)[10]
50	107,746	5.3	Moderately steep to steeply sloping mountain ridges and sideslopes.	Northern part of ES area; specifically, Garfield County where elevation exceeds 8,000 feet.	Parachute	Sandstone	20-40	Well drained	Loam	Loam	6.6-7.3	0.6-2.0	Medium	.24	1030
					Roan										
					Northwater	Sandstone	>40	Well drained	Loam	Very channery clay loam	6.6-7.3	0.6-2.0	Medium	.32	
					Irigul	Igneous & Metamorphic	<20	Well drained	Very channery loam	Very channery loam	7.4-7.8	0.6-2.0	Rapid	.28	
					Silas	Alluvium	>40	Somewhat poorly drained	Loam	Loam	6.6-7.3	0.6-2.0	Slow to medium	.29	
52	63,797	3.1	Nearly level to steeply sloping alluvial fans, valley sideslopes, and old terrace levels.	Eastern portion of ES area, near communities of Mesa, Molina, and Collbran.	Peninsula	Alluvium	>40	Well drained	Loam	Clay	6.6-7.3	<0.2	Medium to rapid	.32	1220
					Collbran	Alluvium	>40	Well drained	Loam	Clay	6.6-8.4	0.2-0.6	Slow to rapid	.24	
					Scholle	Alluvial fan sediments	>40	Well drained	Gravelly loam	Gravelly clay loam	7.4-8.4	0.6-2.0	Slow to medium	.32	
					Dominguez	Alluvium	>40	Well drained	Clay loam	Clay	7.9-8.4	0.06-0.2	Rapid	.24	
53	58,780	2.9	Nearly level to steeply sloping upland hills, alluvial fans and sideslopes, and old terrace levels.	Lower slopes of Grand Mesa.	Jerry	Alluvial fan sediments	>40	Well drained	Loam	Gravelly clay loam	6.6-7.3	0.06-0.2	Rapid	.32	1405
					Cochetopa	Alluvial fan sediments	>40	Well drained	Stony loam	Stony clay	6.6-7.3	0.06-0.2	Medium to rapid	.24	
					Scholle	Alluvial fan sediments	>40	Well drained	Gravelly loam	Gravelly clay loam	7.4-8.4	0.6-2.0	Slow to medium	.24	
56	8,725	0.4	Nearly level to gently sloping flood plains and low terraces.	Extreme southwestern part of ES area in Sinbad Valley.	Glenburg	Alluvium	>40	Well drained	Sandy loam	Sandy loam	7.9-8.4	6.0-20.0	Slow	.24	260
					Rock Outcrops[11]										
91	106,874	5.2	Alluvial fans, flood plains, and narrow alluvial valleys.	Grand Valley	Billings	Alluvium	>40	Well drained to moderately well drained	Silty clay loam	Silty clay loam	7.4-8.4	<0.2	Slow to medium	Not Rated	650
					Ravola	Alluvium	>40	Well drained	Loam	Loam	7.4-8.4	0.6-2.0	Medium	.43	
92	128,030	6.3	Gently to steeply sloping upland hills and ridges, alluvial fans, valley sideslopes, and narrow alluvial valleys.	South-facing aspects north of Grand Valley.	Chipeta	Shale	<20	Well drained	Silty clay loam	Silty clay	7.4-9.0	0.06-0.2	Medium to rapid	.49	454
					Persayo	Sedimentary rocks	<20	Well drained	Silty clay loam	Silty clay loam	7.9-8.4	0.2-0.6	Medium to rapid	.43	
					Fruita	Alluvial fan sediments	>40	Well drained	Very fine sandy loam	Loam	7.4-8.4	0.6-2.0	Medium	.37	
					Billings	Alluvium	>40	Well drained to moderately well drained	Silty clay loam	Silty clay loam	7.4-8.4	<0.2	Slow to medium	.24	
					Badlands[12]									Not Rated	
93	44,384	2.2	Broad valley terraces and old outwash plains, gently sloping alluvial fan surfaces, and moderately to steeply sloping upland hills and ridges.	1) West-central portion of the ES area near the Colorado-Utah State Line, and 2) Central section on the lower north-facing slopes of the Colorado River.	Fruita	Alluvial fan sediments	>40	Well drained	Very fine sandy loam	Loam	7.4-8.4	0.6-2.0	Medium	.24	700
					Avalon	Alluvial fan sediments	>40	Well drained	Loam	Loam	7.9-8.4	0.6-2.0	Slow to medium	.43	
					Mack	Alluvial fan sediments	>40	Well-drained	Loam	Clay loam	7.4-8.4	0.6-2.0	Medium	.20	
					Persayo	Sedimentary rocks	<20	Well drained	Silty clay loam	Silty clay loam	7.9-8.4	0.2-0.6	Medium to rapid	.47	
94	31,082	1.5	Nearly level to gently sloping flood plains, high terraces, mesa tops, and old pediment surfaces.	Along the Colorado River in the Grand Valley area.	Mesa	Alluvial fan sediments	>40	Well drained	Loam	Clay loam	7.4-8.4	0.2-0.6	Slow to medium	.37	700

TABLE 2-4 (Continued)

SUMMARY OF PHYSICAL AND CHEMICAL SOIL CHARACTERISTICS

Mapping	Acres	Percent of ES Area (Includes	Geographic Setting	Distribution Within ES Area	Soil Series[1]	Parent Material[2]	Soil Depth[3/] (inches)	Soil Drainage[4/]	Surface[5/] Soil Texture	Subsoil[5/] Texture	Reaction[6/] (pH)	Permeability[7/] (inches/hour)	Surface Runoff[8/]	Soil Erodibility (K Factor) of Surface Soil[9/]	Potential Plant Productivity (rounds/acre, dry wt.)[10/]
					Redland	Alluvium	>40	Well-drained	Loam	Loam	7.9-8.4	0.6-2.0	Medium	.37	
					Thoroughfare	Alluvium	>40	Well drained	Fine sandy loam	Fine sandy loam	7.9-8.4	2.0-20.0	Slow to very slow	.28	
95	94,114	4.6	Moderately to steeply sloping upland hills, ridges and mesas, and broad rolling terraces and old outwash plains.	South-central portion of the ES area near the town of Whitewater.	Utaline	Alluvial fan sediments	>40	Well drained	Cobbly loam	Very cobbly loam	7.9-8.4	0.6-2.0	Medium	.17	700
					Nelman	Sandstone	20-40	Well drained to somewhat excessively drained	Fine sandy loam	Fine sandy loam	7.9-8.4	6.0-20.0	Slow	.15	
					Lazear	Sandstone	<20	Well drained	Gravelly loam	Gravelly loam	7.9-8.4	0.6-2.0	Rapid	.20	
					Blackston	Alluvial fan sediments	>40	Well drained	Gravelly loam	Gravelly loam	7.9-8.4	6.0-20.0	Slow	.10	
					Avalon	Alluvial fan sediments	>40	Well drained	Loam	Loam	7.9-8.4	0.6-2.0	Slow to medium	.43	
96	458,246	22.4	Nearly level to strongly sloping uplands, alluvial fans, and mesa tops.	Southwest part of the ES area, including Colorado National Monument and the town of Gateway.	Palma	Alluvial fan sediments	>40	Well drained to somewhat excessively drained	Fine sandy loam	Fine sandy loam	6.6-8.4	2.0-6.0	Slow	.24	403
					Potts	Alluvial fan sediments	>40	Well drained	Loam	Clay loam	6.6-8.4	0.6-2.0	Medium	.37	
					Batterson	Sandstone	<20	Well drained to somewhat excessively drained	Loamy sand	Loamy sand	7.9-8.4	6.0-20.0	Slow	.24	
					Loma	Aedian materials	>40	Well drained	Loam	Silty clay	7.9-8.4	0.06-0.2	Medium	.43	
					Rock Outcrop[11/]									Not Rated	
97	152,022	7.4	Hillcrests, upland hills, and mountain sideslopes.	Southern portion of the ES area, including Unaweep Canyon and the lower slopes surrounding the Uncompahgre National Forest.	Owen Creek	Sandstone & Shale	20-40	Well drained	Silt loam	Silty clay	6.6-7.3	0.06-0.2	Rapid	.37	1630
					Miracle	Sandstone	20-40	Well drained	Fine sandy loam	Sandy clay loam	6.6-7.3	0.6-2.0	Medium to rapid	.32	
					Skyway	Sandstone	20-40	Well drained	Fine sandy loam	Fine sandy loan	6.6-7.3	2.0-6.0	Slow	.20	
98A	48,421	2.4	Gently to steeply sloping upland hillsides and ridges.	Surrounding slopes of Grand Mesa and Uncompahgre National Forests.	Mayflower	Shale	20-40	Well drained	Silt loam	Silty clay	6.6-7.3	0.06-0.2	Rapid	.24	1599
					Cebone	Sandstone & Shale	20-40	Well drained	Loam	Clay	6.6-7.3	0.06-0.2	Rapid	.20	
					Bangston	Sandstone	>40	Well drained to somewhat excessively drained	Sandy loam	Loamy sand	6.6-7.3	>6.0	Slow	.15	
					Gateway	Sandstone & Shale	20-40	Well drained	Loam	Silty clay	6.1-6.5	0.06-0.2	Rapid	.28	
98B	56,816	2.8	Gentle to steep upland hills, ridges, and mountainsides.	Eastern portion of the ES area on the slopes surrounding Grand Mesa National Forest.	Bucklon	Shale	<20	Well drained	Loam	Clay loam	6.6-7.3	0.2-2.0	Medium	.32	1840
					Inchau	Sandstone & Shale	20-40	Well drained	Loam	Gravelly loam	6.6-7.3	0.6-2.0	Medium	.32	
					Cochetopa	Alluvial fan sediments	>40	Well drained	Stony loam	Stony clay	6.6-7.3	0.06-0.2	Medium to rapid	.24	
					Jerry	Alluvial fan sediments	>40	Well drained	Loam	Gravelly clay loam	6.6-7.8	0.06-0.2	Rapid	.32	
					Dollard	Shale	20-40	Well drained	Silty clay loam	Silty clay	7.9-8.4	0.06-0.2	Medium to rapid	.37	
99	516,698	25.3	Nearly level to very steep uplands and mountain sideslopes.	Throughout the ES area.	Veatch	Colluvium from Sedimentary rocks	20-40	Well drained	Channery loam	Channery sandy loam	7.9-8.4	0.6-2.0	Medium	.28	410
					Castner	Sandstone, Argillite, or Quartzite	<20	Well drained	Channery sandy loam	Very channery loam	6.6-8.4	0.6-2.0	Slow to rapid	.28	
					Rock Outcrops[11/]									Not Rated	

TABLE 2-4 (Continued)

SUMMARY OF PHYSICAL AND CHEMICAL SOIL CHARACTERISTICS

Mapping Unit No.	Acres	Percent of ES Area (Includes All Lands) of ES Area	Geographic Setting	Distribution Within ES Area	Soil Series[1]	Parent Material[2]	Soil Depth[3/] (inches)	Soil Drainage[4/]	Surface[5/] Soil Texture	Subsoil[5/] Texture	Reaction[6/] (pH)	Permeability[7/] (inches/hour)	Surface Runoff[8/]	Soil Erodibility (K Factor) of Surface Soil[9/]	Potential Plant Productivity (rounds/acre, dry wt.)[10/]
100	104,692	5.1	Major valleys.	Major valleys of Book Cliffs, the Roan Plateau, Roan Creek, and along the Colorado River from DeBeque to Rifle.	Arvada	Sedimentary rocks	>40	Well drained	Fine sandy loam	Clay	7.4-9.0	<0.06	Medium to rapid	.49	838
					Haverson	Alluvium	>40	Well drained	Loam	Loam	7.9-8.4	0.6-2.0	Slow	.28	
					Heldt	Alluvial fan sediments	>40	Well drained to moderately well drained	Silty clay loam	Silty clay	7.9-9.0	0.06-0.2	Slow to very slow	.28	
					Scholle	Alluvial fan sediments	>40	Well drained	Gravelly loam	Gravelly clay loam	7.4-8.4	0.6-2.0	Slow to medium	.32	
					Nihill	Alluvium	>40	Well drained to excessively drained	Gravelly loam	Very gravelly loam	7.4-8.4	2.0-6.0	Rapid	.24	
116	64,887	3.1	Nearly level to very steep mountainsides and ridges.	Northern edge of the Roan Plateau.	Parachute	Sandstone	20-40	Well drained	Loam	Loam	6.6-7.3	0.6-2.0	Medium	.24	1520
					Irigul	Igneous & Metamorphic	<20	Well drained	Very channery loam	Very channery loam	7.4-7.8	0.6-2.0	Rapid	.28	
					Castner	Sandstone, Argillite, or Quartzite	<20	Well drained	Channery sandy loam	Very channery loam	6.6-8.4	0.6-2.0	Slow to rapid	.28	

1/ A soil series is defined as the basic unit of soil classification; it is a subdivision of a family and consists of soils which are essentially alike in all major profile characteristics except the texture of the A horizon (Soil Science Society of America Proceedings 1965).

2/ Parent material refers to the unconsolidated and more or less chemically weathered mineral or organic matter from which the soil is developed (Soil Science Society of America Proceedings 1965).

3/ Soil depth is the depth of the unconsolidated mineral material; it is defined as follows: (Soil Conservation, Agriculture Handbook No. 18, 1951)

Class	Depth in Inches
Very deep	60"
Deep	40-60"
Moderately deep	20-40"
Shallow	10-20"
Very shallow	10"

4/ Soil drainage classes are based on those morphological characteristics that are affected by different degrees of aeration within the soil profile (Soil Conservation Service, "Definitions and Abbreviations for Soil Descriptions", 1974):
Very poorly drained: water remains at or near the surface a greater part of the time.
Poorly drained: soil remains wet much of the time with the water table near the surface for prolonged intervals.
Somewhat poorly drained: soil is wet for significant periods, usually because of a slowly permeable layer or a high water table.
Moderately well drained: profile is wet for a small but significant part of the time, usually because of a slowly permeable layer within or immediately beneath the soil profile, a relatively high or intermittently high water table, or surface additions of water by runoff from areas higher up the slopes.
Well drained: water is removed readily but not rapidly.
Somewhat excessively drained: water is removed from these soils rapidly.
Excessively drained: water is removed from these soils very rapidly.

5/ Soil texture refers to the relative proportions of the various size groups of individual soil grains in a mass of soil. Specifically, it refers to the proportions of clay, silt and sand below 2 millimeters in diameter. The presence of coarse particles larger than very coarse sand (or 2 mm.) and smaller than 10 inches is recognized by modifiers of textural class names (Soil Conservation Service, Agriculture Handbook No. 436, 1975)

6/ Soil reaction is the degree of acidity or alkalinity of a soil, expressed as a function of pH (Soil Conservation Service, Agriculture Handbook No. 18., 1951):

Extremely acid	pH<4.5
Very strongly acid	4.5-5.0
Strongly acid	5.1-5.5
Medium acid	5.6-6.0
Slightly acid	6.1-6.5
Neutral	6.6-7.3
Mildly alkaline	7.4-7.8
Moderately alkaline	7.9-8.4
Strongly alkaline	8.5-9.0
Very strongly alkaline	>pH-9.0

7/ Soil permeability is defined as the ease with which gases, liquids, or plant roots penetrate or pass through a layer of soil (Soil Science Society of America Proceedings 1965):

Class	Rate(inches/hour)
Very slow	<0.06
Slow	0.06-0.2
Moderately slow	0.2-0.6
Moderate	0.6-2.0
Moderately rapid	2.0-6.0
Rapid	6.0-20.0
Very rapid	>10.0

8/ Surface runoff refers to the relative rate at which water is removed by flow over the soil surface (Soil Conservation Service, Agriculture Handbook No. 18, 1951):
Class
Ponded - no water escapes as runoff.
Very slow- surface water flows away so very slowly that free water lies on the surface for long periods or enters immediately into the soils.
Slow - surface water flows away so slowly that free water covers the soil for significant periods or enters the soil rapidly.
Medium - surface water flows away at such a rate that a moderate proportion of water enters the soil profile and free water lies on the surface for only short periods.
Rapid - a large proportion of precipitation moves rapidly over the soil surface and a small part moves through the soil profile.

9/ Soil erodibility is a measure of the rate at which a soil will erode and expressed as the "K" factor (soil erodibility factor) defined as the erosion rate per unit of erosion (Soil Conservation Service, Universal Soil Loss Equation, January 1976.)

10/ The production potential (total lbs. of dry vegetation) for the individual soils was obtained from Soil Conservation Service soil survey reports and range site descriptions.* The potential for the association was obtained by taking the percent of individual soils in the association, and multiplying this by its production potential, and then adding them together for a weighted average.

Example: Hooper (50%), Corlette (20%), & Other (30%)

Hooper - .50 X 750**(RPP) = 375
Corlette - .20 X 500 (RPP) = 100
Other*** - .30 X 600 (RPP) = 180
655

The production potential for this association is 655#/acre of total vegetation dry weight.
* Each soil is placed in a range site by the SCS. The SCS through clippings have rated each site for its potential to produce vegetation.
** The Hooper soil is in a range site that will produce 750# of total dry vegetation/acre.
***Inclusions of other soils.

11/ Rock outcrops is a miscellaneous land type composed of exposed bedrock (usually occupying 90 percent of the area) and associated very shallow soils (less than 10 inches deep). The land type characteristics are not rated.

12/ Badlands is a miscellaneous land type generally devoid of vegetation and broken by an intricate maze of narrow ravines, sharp crests, and pinnacles resulting from erosion of soft geologic material (Soil Science Society of America Proceedings 1965). The land type characteristics are not rated.

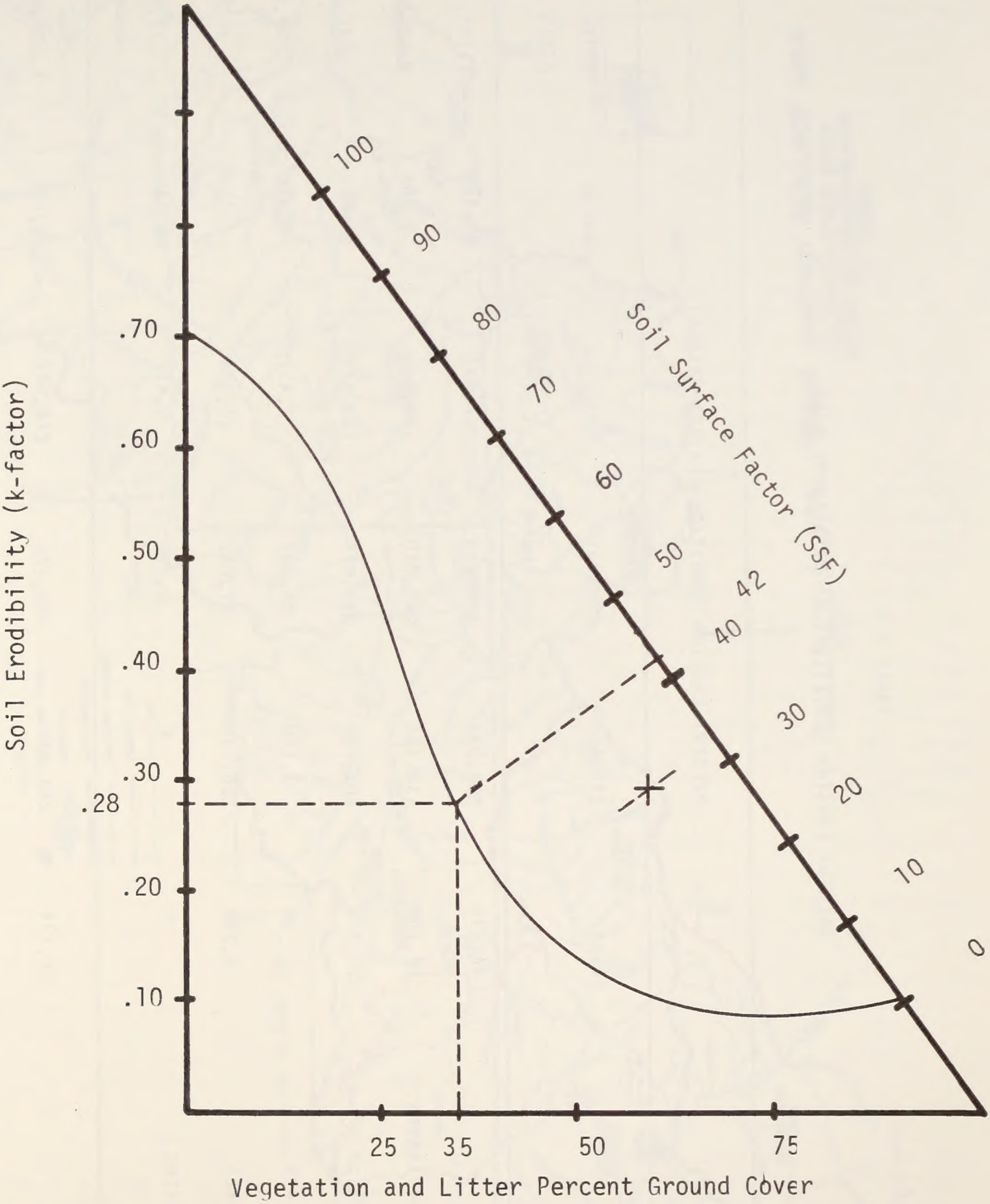
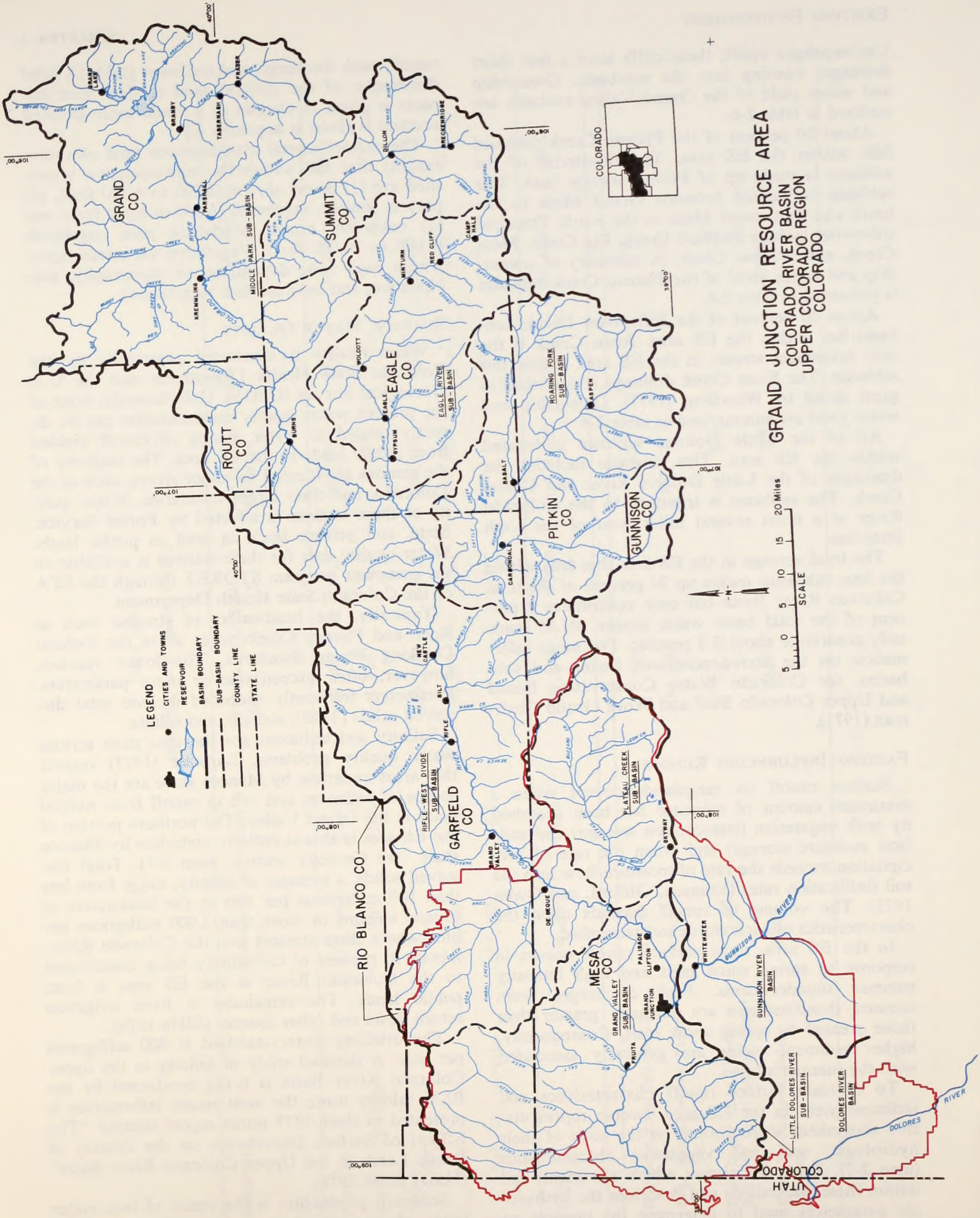


FIGURE 2-14
Erosion condition (SSF) as affected by inherent soil susceptibility to erosion and amount of vegetation and litter. This is a conceptual model only. The solid curving line is only for visualizing realistic relationships. Most points within the triangle are possible.

TABLE 2-5

PRESENT EROSION CONDITIONS BY MANAGEMENT PLAN

	PRESENT EROSION CONDITION CLASSES (ACRES)					
	Stable	Slight	Moderate	Critical	Severe	TOTAL ACRES
AMPS (INTENSIVE)	41,879	234,233	557,643	246,842	25,163	1,105,760
1. Deferred Rotation	17,108	130,365	240,210	135,751	3,402	526,836
2. Rest Rotation	24,771	101,708	291,026	103,679	13,851	535,035
3. Best Pasture	0	2,160	26,407	7,412	7,910	43,889
AMPS (LESS INTENSIVE)	8,295	20,715	27,892	22,208	100	79,210
ELIMINATION OF GRAZING	0	0	2,990	9,452	3,445	15,887
TOTAL	50,174	254,948	588,525	278,502	28,708	1,200,857



Map 2-6. Colorado River Basin

Uncompahgre uplift; these cliffs have a few short drainages running into the sub-basin. Ownership and water yield of the Grand Valley subbasin are outlined in table 2-6.

About 50 percent of the Plateau Creek subbasin falls within the ES area. The remainder of the subbasin is made up of Forest Service land. This subbasin is located between Grand Mesa to the south and Battlement Mesa to the north. Principal tributaries include Buzzard Creek, Big Creek, Mesa Creek, and Willow Creek. A summary of ownership and water yield of the Plateau Creek subbasin is presented in table 2-6.

About 30 percent of the Rifle-West Divide subbasin lies within the ES area. Roan Creek is the only prominent stream in the ES area within this subbasin. The Roan Creek drainage is described in great detail by Woodling (1977). Ownership and water yield are summarized in table 2-6.

All of the Little Dolores subbasin is located within the ES area. This subbasin includes the drainages of the Little Dolores River and Coates Creek. The subbasin is tributary to the Colorado River at a point several miles west of the Utah State line.

The total acreage in the ES area that falls within the four subbasins makes up 24 percent of the total Colorado River Basin but only contributes 8 percent of the total basin water supply. BLM lands only contribute about 3.8 percent. For more information on the above-mentioned basins and subbasins, see Colorado Water Conservation Board and Upper Colorado Staff and Work Group Chairman (1971).

FACTORS INFLUENCING RUNOFF

Surface runoff on rangelands occurs when a maximum amount of moisture has been absorbed by both vegetation (interception storage) and soils (soil moisture storage) and when the rate of precipitation exceeds the rate of moisture flow into the soil (infiltration rate) (Branson, Gifford, and Owen 1972). The volume of runoff depends upon the characteristics of each storm and watershed.

In the ES area, most surface runoff occurs in response to spring snow melt and high intensity summer thunderstorms. Peak discharges from summer thunderstorms are normally greater than those created by spring snow melt. Consequently, higher sediment yields are generally associated with the summer storms.

To evaluate surface runoff characteristics and sediment yield in the ES area, twelve representative watersheds were chosen on the basis of their hydrologic, soil, and vegetative characteristics (map 2-7). Table 2-7 shows which allotments fall within these watersheds and describes the hydrologic parameters used to determine the impacts on runoff, peak discharge, and sediment yield. (A brief description of the method used to determine impacts is given in chapter 3; a much more detailed account is given in appendix 4.)

The major vegetal classifications (and elevation ranges) that fall within the representative watershed are (1) desert shrubs (4,500 to 6,500 feet), (2) pinyon, juniper, sagebrush (6,000 to 8,000 feet), and (3) oakbrush, aspen, ponderosa pine, sagebrush (7,000 to 10,000 feet). Vegetative variations occur within each zone depending on topography, precipitation, and land use (see Vegetation).

SURFACE WATER QUALITY

Water quality is monitored principally by the Colorado State Health Department and the U.S. Geological Survey (USGS). Unfortunately, none of the present water quality measurements can be directly related to water quality of runoff yielded from public lands in the ES area. The majority of the stations are located on major rivers, such as the Colorado, and their larger tributaries. Water quality at these stations is affected by Forest Service, State, and private lands as well as public lands. Water quality data for these stations is available on the computer program STORET through the EPA or the Colorado State Health Department.

Typically, the headwaters of streams such as Roan and Plateau Creeks meet all of the Federal Drinking Water Standards. The lower reaches, however, often exceed one or more parameters. Parameters frequently exceeded include total dissolved solids (TDS), sodium, and sulfate.

Salinity and sediment are the two most serious water quality problems. Laronne (1977) reports that areas underlain by Mancos shale are the major source of sediment and salt in runoff from natural lands in the Grand Valley. The northern portion of the ES area is almost entirely underlain by Mancos shale (see Geology section, map 2-1). Total dissolved solids, a measure of salinity, range from less than 100 milligrams per liter in the headwaters of several streams to more than 3,000 milligrams per liter where these streams join the Colorado River. About 10 percent of the salinity being contributed to the Colorado River in the ES area is from public lands. The remainder is from irrigation return flows and other sources (Elkin 1976).

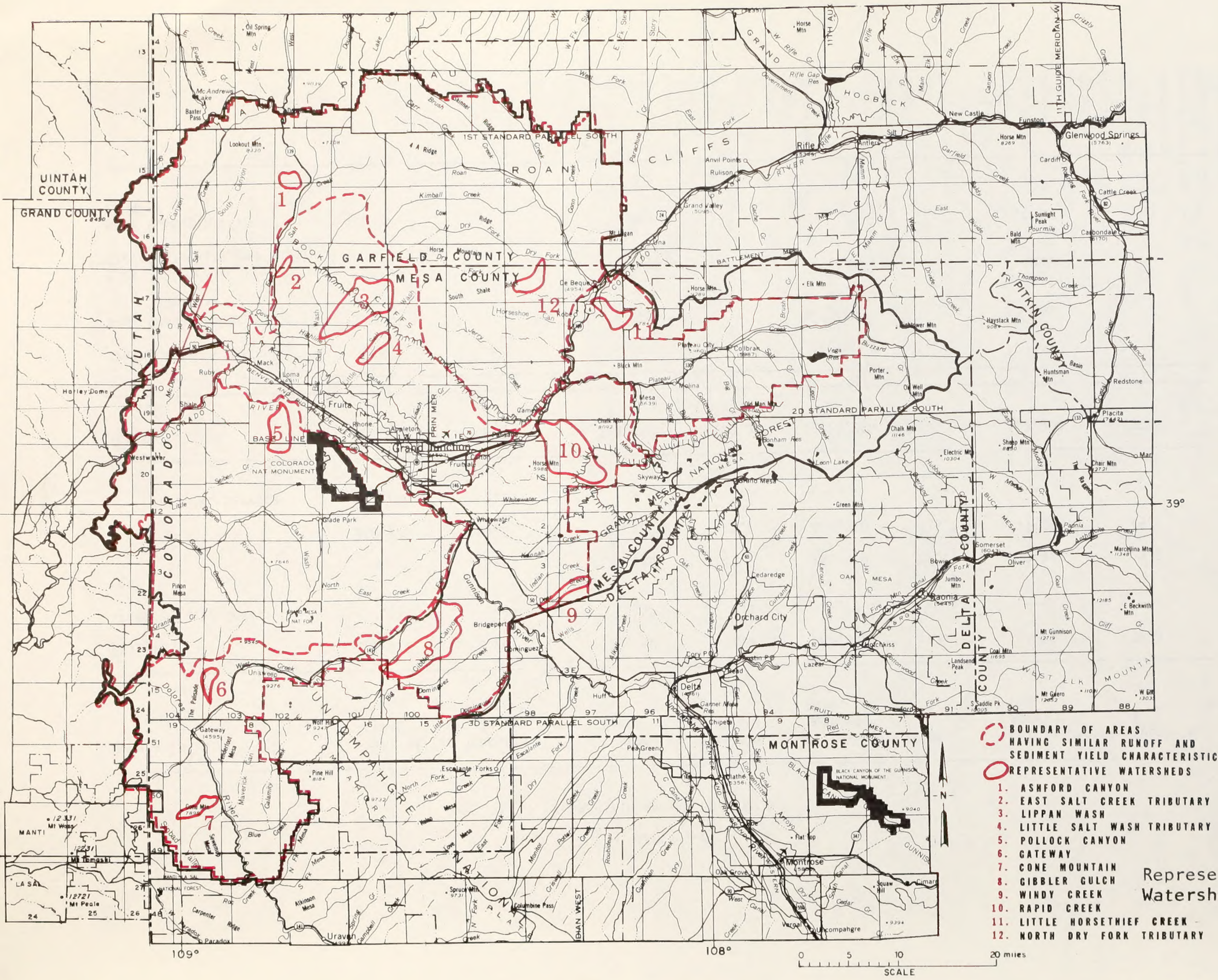
The drinking water standard is 500 milligrams per liter. A detailed study of salinity in the upper Colorado River Basin is being conducted by the BLM salinity team; the most recent information is presented in their 1977 status report entitled "The Effects of Surface Disturbance on the Salinity of Public Lands in the Upper Colorado River Basin" (USDI BLM 1978).

Sediment production is the result of two major types of erosion: sheet and/or rill erosion and

TABLE 2-6

OWNERSHIP AND WATER YIELDS

Ownership	Grand Valley Subbasin		Plateau Ck. Subbasin		Rifle-West Divide Subbasin		Little Dolores Subbasin	
	Acres	%	Acres	%	Acres	%	Acres	%
Private	276,510	33.0	143,560	37.3	544,530	42.7	84,200	52.6
State & Local Govt.	3,510	0.4	1,750	0.5	6,230	0.5	---	---
Fed.								
F.S.	---	---	189,130	49.1	256,410	20.1	3,450	2.2
BLM	540,970	64.5	50,200	13.1	467,070	36.7	72,350	45.2
Nat. Pk. Service	17,730	2.1	---	---	---	---	---	---
Total	838,720	100.0	384,640	100.0	1,274,240	100.0	160,000	100.0
Drainage Area (sq. mi.)	1,310		601		1,991		250	
Avg. Annual Water Yield (ac. ft.)	55,890		164,820		347,430		18,030	
% of Upper Colo. River Basin's Total Water Supply	1.5%		4.5%		10%		0.5%	
% of Subbasin within ES Area	100%		50%		30%		100%	



Map 2-7.

Representative Watersheds

TABLE 2-7

HYDROLOGIC PARAMETERS OF REPRESENTATIVE WATERSHEDS

Watershed & Allotments within each Watershed	Grazing Systems1/	Area (sq. mile)	Percent of Public Land in ES Area	Elevation (Ft.)		Weighted Mean	Average Slope Length2/ (Feet)	Average Land Slope %3/	Present Infiltration Rates (in/hr) (avg.)	Hydraulic Length (miles)4/	% Mean Stream Gradient5/
				Min	Max						
Cone Mountain	DR	2.288	0.1	4700	7900	6400	214	31.4	1.36	5.1	12.6
419 Hubbard											
Little Horsethief6/		4.011	0.1	4900	7800	6000	209	41.8	1.47	6.3	5.3
811 Lyons-Anderson	DR										
801 Sunnyside(E)	RR										
Pollock Canyon		8.618	0.3	4500	6800	5650	156	13.8	0.60	5.9	5.8
130 Colo-Black Ridge	DR										
141 Three Cyns	RR										
142 Colorado River											
143 Radio Tower											
Lipan Wash	RR	20.536	0.6	4800	7300	5650	475	18.0	1.72	10.1	5.3
507 Little Salt	DR/RR										
502 Coal Gulch & Roan Creek											
Rapid Creek7/		20.769	0.3	4800	10000	8000	428	25.1	1.17	9.9	9.5
809 Wild Country Common	DR										
835 Lower Rapid-Cottonwood	DR										
845 Chalk Mtn.	LI										
Gateway		2.293	0.1	4900	8100	6500	246	20.0	1.43	5.0	12.3
151 Pine Ridge	LI										
402 Bulldraw Common	DR										
405 Wright Draw	DR										
North Dry Fork Common		2.211	0.1	5300	7400	6300	207	33.0	1.30	3.6	9.7
710 Rodeo Grounds	RR										
East Salt Creek	RR	1.720	0.1	4950	6550	5750	717	4.6	1.81	3.3	8.5
602 East Salt(E)											
Little Salt Wash		2.951	0.1	4800	5300	5050	583	4.8	1.54	4.8	2.0
504 Hunter Wash	RR										
507 Little Salt	RR										
Gibbler Common	RR	24.883	0.8	6100	8700	7200	428	11.2	1.91	15.1	3.1

TABLE 2-7 (Continued)

HYDROLOGIC PARAMETERS OF REPRESENTATIVE WATERSHEDS

Watershed & Allotments within each Watershed	Grazing Systems1/	Area (sq. mile)	Percent of Public Land in ES Area	Elevation (Ft.)		Weighted Mean	Average Slope Length2/ (Feet)	Average Land Slope %3/	Present Infiltration Rates (in/hr) (avg.)	Hydraulic Length (miles)4/	% Mean Stream Gradient5/
				Min	Max						
301(E)											
Windy Creek 202 Kannah Creek Common	RR	4.770	0.1	5200	6700	6100	595	11.5	1.23	7.1	6.5
Ashford Canyon8/ 602 East Salt(E)	RR	1.978	0.1	5700	7400	6050	318	41.0	1.63	2.3	3.5

1/ DR = deferred rotation; RR = rest rotation; LI = less intensive management.
2/ Average slope length is the length of overland flow on a slope.
3/ Average slope was determined by calculating the average of several randomly selected slope measurements.
4/ Hydraulic length is the length of the longest stream channel in the watershed.
5/ Mean stream gradient is the average slope of the longest stream in the watershed.
6/ Of the 4.011 sq. mi. in Little Horsethief Cr. watershed, only 3.8 sq. mi. are on public land.
7/ Of the 20.769 sq. mi. in Rapid Creek watershed, only 10.76 sq. mi. are on public land.
8/ Allotment & Existing AMP.

channel erosion. The majority of the sediment being produced in the ES area is the result of channel erosion. Map 2-8 is an erosion map adapted from maps developed by the SCS, which shows the major classes of sediment production.

Ground Water Resources

The ground water resources in the ES area are used mainly to augment surface water supplies on small farms and ranches. There is very little development of the ground water resource because of the availability of surface water and the fact that well yields are generally small and of poor quality. However, there are vast supplies of ground water in several geologic formations. Table 2-8 quantifies the yield of various aquifers and shows where these outcrop in the ES area.

Valley fill deposits in the Grand Valley, Roan Creek, Plateau Creek, and Unaweep Canyon areas contain a majority of the wells. These wells are generally privately owned and serve one or two farms or ranches. Although the valley fill deposits are known to yield as much at 100 gallons per minute, most of the wells produce less than 50 gallons per minute.

GROUND WATER QUALITY

The overall quality of the ground water in the ES area is considered to be slightly to moderately saline (containing mineral salts), with 1,000 to about 10,000 milligrams per liter of dissolved solids (Price and Waddell 1973). Wells located in the Mancos shale formation, Dakota sandstone, and valley fill deposits yield water considered saline by the Price and Waddell criteria.

The small amounts of water found in the Mancos shale are normally very saline due primarily to the marine deposits associated with that formation. Water in the Dakota formation generally contains 500 to 3,000 milligrams per liter of dissolved solids, and the principal ion pairs include sodium bicarbonate and sodium chloride. Locally, high concentrations of selenium and arsenic can be found in the Dakota sandstone formation (Anderson 1976). The USGS reported that:

> Water in the valley-fill deposits commonly is hard and contains varying amounts of calcium, magnesium, bicarbonate, and sulfate. The water generally is more mineralized than that in adjacent streams. In some areas dissolved-solids content exceeds 1,000 mg/1 (milligrams per liter), particularly where irrigation water leaches salts from underlying or adjacent rocks in the Mancos shale as in the Uncompahgre Valley. Salts also concentrate in water owing to evaporation in areas that are poorly drained where the water table is close to the land surface (Boettcher 1972).

The occasional springs and wells found in the igneous and metamorphic rock formations usually yield good quality water. The water is low in dissolved solids, primarily because of the geochemical properties of the crystalline rocks and the high elevations of the formations. The water in the aquifer originates as rainfall or snowmelt at higher elevations and is not affected by the lower elevation marine deposits.

Natural discharge of ground water supplements stream runoff as baseflow. The dissolved solids in ground water discharged to the streams are a major part of the total salt load in the streams.

Wildlife

The ES area provides food and cover for a large variety of animals. Many of these animals are yearlong residents, while others are present for only a portion of the year. Species on which grazing is felt to have a significant impact are discussed in the following paragraphs. Little detailed information is available on a number of species, especially the smaller nongame animals. Species are arranged according to major taxonomic groups.

Deer and elk populations are presently increasing. Present DOW goals are to increase herd sizes, especially those of mule deer and elk, through management of habitat (in cooperation with BLM and USFS) and populations (hunting seasons, number of tags issued, and either-sex areas).

Detailed information on vertebrate wildlife species is presented in appendix 9; this allows a more detailed study of impacts. Intensive wildlife habitat analysis has not been completed for terrestrial wildlife species. Known terrestrial as well as stream habitat conditions are displayed later in this section.

Game management units (GMUs) are frequently referred to in this chapter. Maps 2-9 and 2-10 portray GMU boundaries in the ES area.

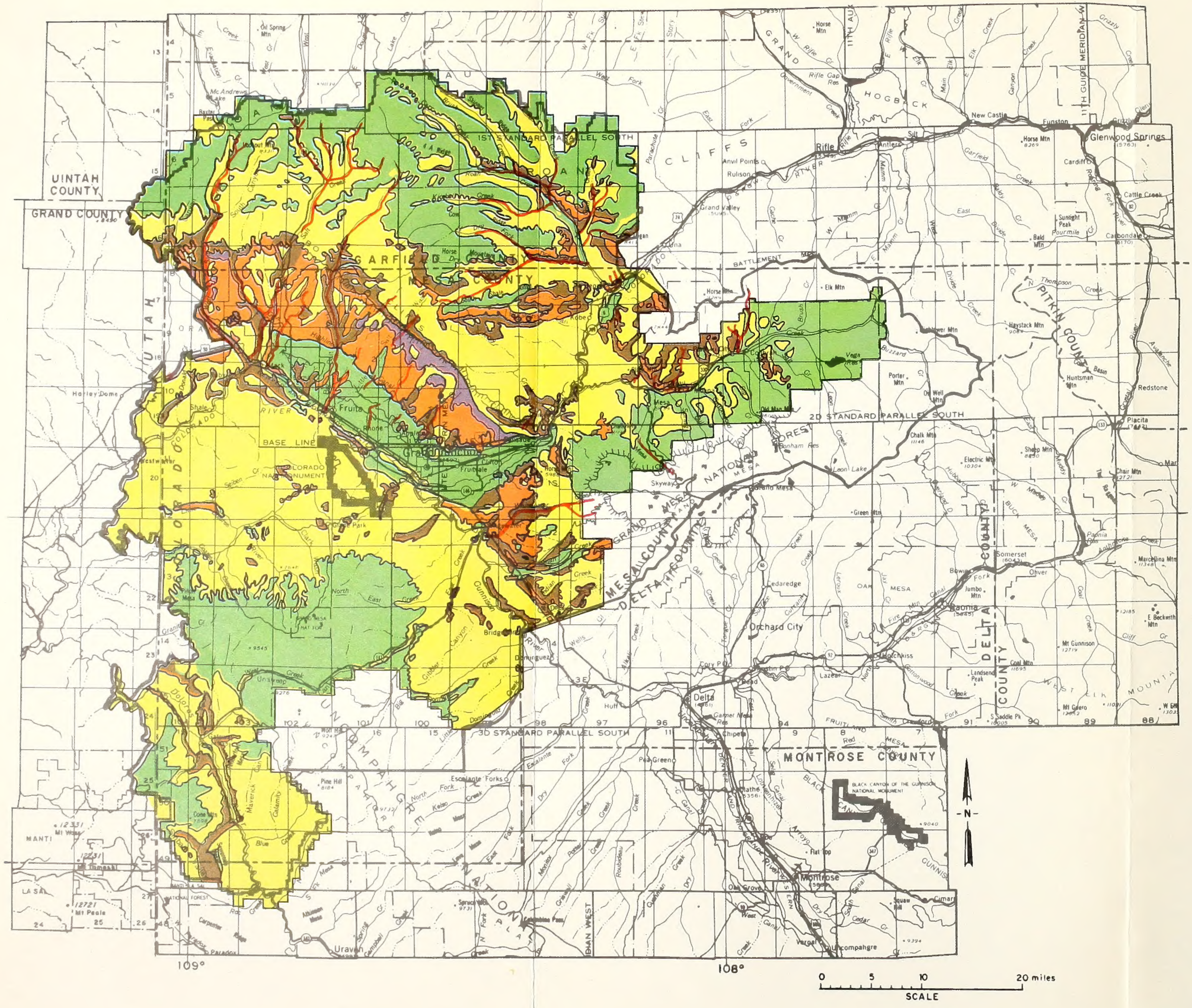
Large Mammals: Ungulates

Mule deer, elk, pronghorn antelope, and bighorn sheep are the major large ungulates present in the ES area.

MULE DEER

Population estimates for the 1976 season based on a computer population simulation model for each of the Division of Wildlife (DOW) Game Management Units (GMUs) are presented in table 2-9. It is impossible to give population data for individual allotments since deer move about frequently in the GMUs. The deer population using public land at least part of the year is approximately 32,759.

Mule deer populations are greatly reduced from the levels of the 1950's and 1960's, apparently due to overutilization of winter ranges and, perhaps, subtle changes in the vegetation occurring on spring and summer ranges. Over the past several



🟪 Very high erosion (12-30 tons per acre per year). Includes areas of extremely steep shale badlands with no vegetative or rock cover.

🟧 High erosion (5-12 tons per acre per year). Includes areas consisting mostly of shale badlands and other severely eroded lands with extensive sheet and rill erosion as well as numerous deep gullies and streambanks. Vegetative and rock cover is sparse.

🟫 Moderately high erosion (2-5 tons per acre per year). Includes rangelands having much sheet and rill erosion and numerous shallow to moderately deep gullies or a few deep gullies and eroding streambanks. Partial vegetative and rock cover.

🟨 Moderately low erosion (1-2 tons per acre per year). Includes rangelands with some sheet and rill erosion and only a few shallow to moderately deep gullies. Fairly good vegetative or rock cover.

🟩 Low erosion (less than 1 ton per acre per year). Includes mainly forest lands, brush lands, grasslands, irrigated lands, and other acres with a good vegetative cover and only an occasional gully or site with obvious sheet or rill erosion.

Severely erode streambanks or gullies with average depth of five feet or more. Erosion is from 2,000 to 4,000 tons per bank mile per year.

ADAPTED FROM SCS RESOURCE BASE MAPS
PREPARED FOR COLORADO WEST AREA
COUNCIL 208 PLAN.

Map 2-8. Erosion in the ES Area

TABLE 2-8

GEOLOGIC UNITS AND THEIR HYDROLOGIC CHARACTER

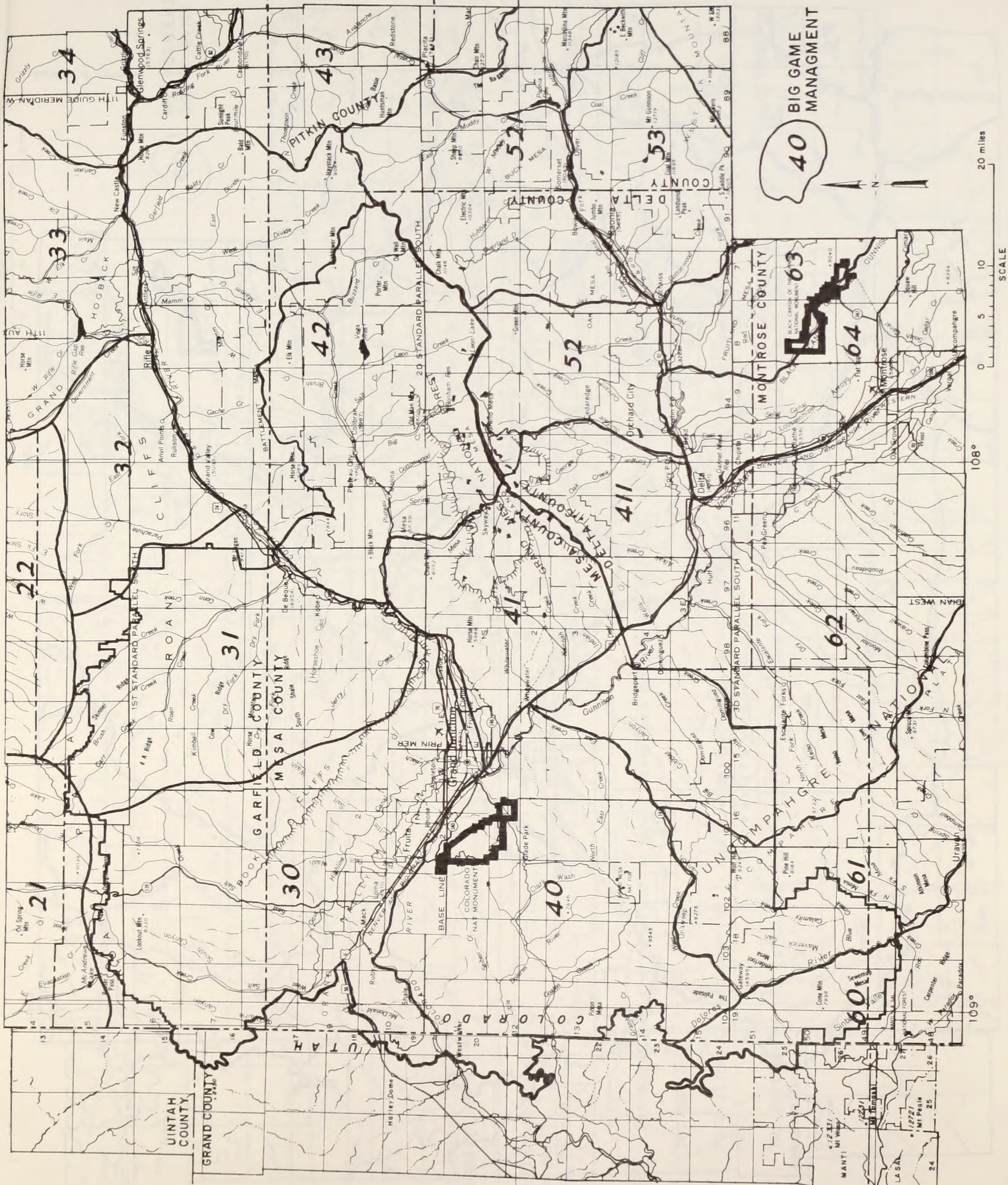
System	Geologic unit	Thickness (feet)	Physical character	Hydrologic character	Areas of outcrop
Quaternary	Valley-fill deposits	20-140	Clay, sand, gravel, boulders, and glacial debris. Generally grades from coarse materials at the headwaters to finer materials downstream.	Principal source of water to large-capacity wells in the area. Yields as much as 1,000 gpm.	Roan Creek, Plateau Creek, Unaweep Canyon, Grand Valley
	Colluvium, landslide debris, glacial moraines, terrace deposits	10-100	Silt, clay sand, gravel, and debris piles.	Yields less than 20 gpm.	Plateau Valley
Tertiary	Volcanic rocks		Lava flows, breccias, tuff, and related materials.	Wells derive water from scoria zones, pores, and fractures. Source of water for domestic and stock supplies; generally yields less than 10 gpm.	Plateau Valley
	Green River Formation	As thick as 3,500	Intertonguing lenses of siltstone, marlstone, sandstone, limestone, and shale.	Wells derive water largely from fractures and solution openings. Sandstone is relatively impermeable. Yields as much as 1,000 gpm.	Northeastern portion of ES Area
	Wasatch Formation	300-5,000	Clay, shale, and lenses of sandstone, limestone, and conglomerate.	Yields water to stock and domestic wells; reported to yield as much as 900 gpm to two irrigation wells.	Northeastern portion of ES area
Cretaceous	Middle Park Formation	2,500-5,000	Sandstone, shale, conglomerate, and breccia.	Source of water to stock and domestic wells.	Northeastern portion of ES Area
	Mesaverde Group	1,500-5,300	Mudstone, shale, coal, and varicolored crossbedded sandstone.	Source of water to many springs and large-capacity wells. Yields as much as 800 gpm.	Northeastern portion of ES Area
	Mancos Shale	1,000-5,000	Marine shale with thin dark-gray to black, dark fissile sandstone beds at various horizons.	Supplies water to stock and domestic wells locally where it contains fractures or weathered zones, but water generally	Central and northeastern portion of ES area.

TABLE 2-8 (Continued)

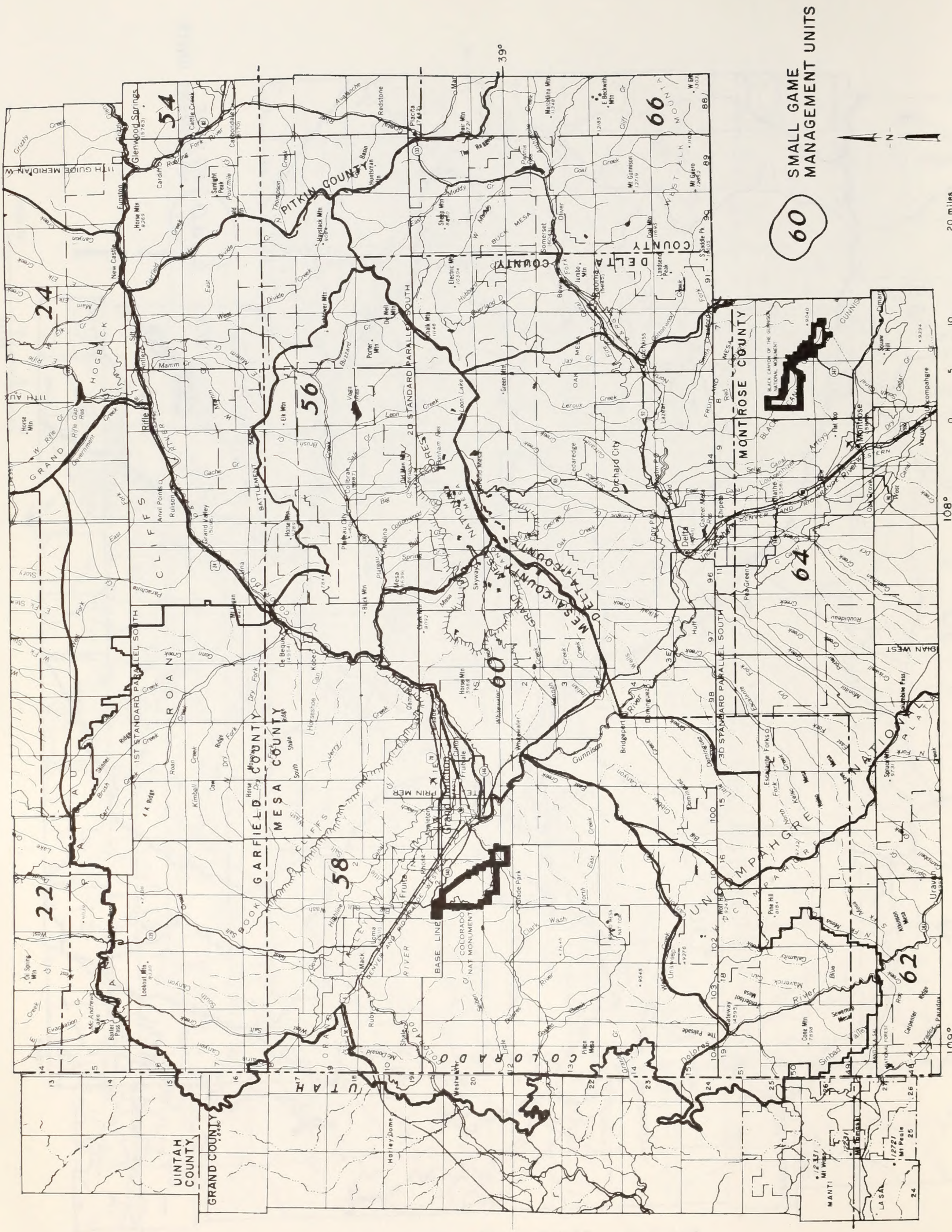
GEOLOGIC UNITS AND THEIR HYDROLOGIC CHARACTER

System	Geologic unit	Thickness (feet)	Physical character	Hydrologic character	Areas of outcrop
				highly mineralized. Not generally considered a source of water.	
	Dakota Sandstone (includes Burro Canyon Formation in southwestern Colorado)	As thick as 300	Light-colored sandstone, dark shale, and thin beds of coal.	Source of water to stock and domestic wells; yields as much as 40 gpm. Locally the water is saline.	Southwestern portion of ES Area
Jurassic	Morrison Formation	250-600	Varicolored siltstone and mudstone with beds of sandstone and limestone.	Source of water to stock and domestic wells locally.	Southwestern portion of ES Area
	Curtis and Summerville Formations	50-200	Crossbedded sandstone, limestone, varicolored siltstone and mudstone.	Source of water for stock and domestic wells.	Southwestern portion of ES Area
	Entrada Sandstone	50-200	Fine-grained sandstone, mostly crossbedded.	Source of water for stock and domestic wells. Locally yields more than 25 gpm.	Southwestern portion of ES Area
Triassic	Glen Canyon and Wingate Sandstones and older Triassic rocks	As thick as 500	Sandstone, lenses of limestone, and varicolored siltstone and mudstone.	Sandstones are sources of water to stock and domestic wells.	Southwestern portion of ES Area
Precambrian	Precambrian rocks		Granite, schist, gneiss, and pegmatite dikes.	Wells derive water from fractures and weathered material. Source of water for domestic and stock supplies; yields are generally less than 10 gpm.	Unaweep Canyon

NOTE: See map 2-1 for a depiction of geological formations in the ES area.



Map 2-9. Big Game Management Units



Map 2-10. Small Game Management Units

TABLE 2-9
MULE DEER POPULATION STATUS

	GAME MANAGEMENT UNITS[1]								
	30	31	40	41	42	60	61	62	Totals
Estimated Total Population [2]	6,827	10,977	22,726	4,147	14,483	4,663	18,046	24,923	106,792
Estimated Population on public lands in the ES area [3]	5,140	6,458	10,544	1,226	1,568	1,682	3,494	2,647	32,759

NOTE: Estimates are the result of a newly developed computer model and, as such, are subject to change.

1/ See map 2-9

2/ Population as of 1 June 1977. Estimates from DOW computer population simulation program developed by Charles Gross of CSU.

3/ The portion of the estimated total population allotted use on public lands within the ES area.

years the population has been stable or, perhaps, increasing slightly.

Public lands in the area are important as summer and winter range. During the summer, deer are generally above 7,500 feet, which includes public lands and, in many areas, National Forest Lands. Approximately 223,000 acres of public land are classified as mule deer summer range.

Mule deer are generally found below 7,000 feet during the winter. Twenty-six areas are considered by BLM and DOW wildlife biologists to be crucial wintering or concentration areas necessary to maintain the mule deer population. Approximately 680,000 acres of public lands serve as winter range, with about 19 percent of that in winter concentration areas.

Map 2-11 shows mule deer summer and winter ranges as well as crucial wintering or concentration areas. Table 2-10 shows the crucial deer winter areas by grazing allotment, class of use, and season of use. Deer are on these winter ranges for approximately five months a year. This varies somewhat, depending on the severity of the winter. Although deer numbers declined dramatically some 10 to 15 years ago, browse utilization remains high, especially in winter concentration areas.

The vegetation types present in the crucial areas are primarily sagebrush and pinyon-juniper, with some mountain shrub. Areas receiving the highest use are south-facing slopes and areas where chaining has occurred.

McKean and Bartman (1971) report serviceberry, mountain mahogany, bitterbrush, big sagebrush, little rabbitbrush, and snowberry to be heavily used by mule deer in the Piceance Basin. In addition, Hubbard and Hansen (1976) report considerable use of pinyon pine and juniper in the same area. Browse transects conducted by BLM personnel in the Gateway Planning Unit in April and May 1976 indicate mule deer use concentrated on blackbrush, big sagebrush, Gambel oak, and mountain mahogany. A summary of mule deer seasonal food habits is presented in table 2-11.

Predation on mule deer stems primarily from mountain lions, coyotes, and, to a lesser degree, bobcats. Although these species almost certainly kill a significant number of deer, the impact on population size is unknown.

ELK

The Colorado Division of Wildlife estimates that the elk population in the ES area is currently increasing, as indicated by an 11 percent increase in harvest for 1976 as compared to the 1972-75 average. During the summer months elk move to higher elevation areas which consist almost entirely of National Forest or private land. West of the Dolores River, the elk move out of Colorado into Utah. Elk are generally in the ES area from mid-November to mid-April, although, during mild winters, many animals may remain on National Forest land throughout the winter (Whitewater URA, Wildlife Steps 3-4, page W-WL-2). The current wintering population of elk based on harvest statistics for each of the DOW GMUs is presented in table 2-12. It is impossible to correlate population data to individual allotments since elk move about frequently in the GMUs. The total elk population dependent on public lands at least part of the year is estimated at 2,053.

Elk generally winter at higher elevations. Crucial winter ranges do not overlap with mule deer with two exceptions: Dominguez Creek and Unaweep Canyon. Elk seasonal use areas and crucial winter ranges are shown on map 2-12. Crucial winter ranges, current allotments, and season of use are listed in table 2-13.

Food habits of elk vary greatly both by season and geographic location. Seasonal food habits were determined in a study conducted by the Colorado Division of Wildlife (Boyd 1970). The results are summarized in table 2-14. This, of all the studies that have been conducted, is the closest to the ES area.

Grass is the major component of the diet during all seasons except winter, when browse becomes quite important. Browse plants found to be important components of the diet during winter include Gambel oak, aspen, serviceberry, big sagebrush, and snowberry. During the spring, the only other season that elk frequent public lands, grass constitutes the largest portion of the diet -- 83.2 percent in May.

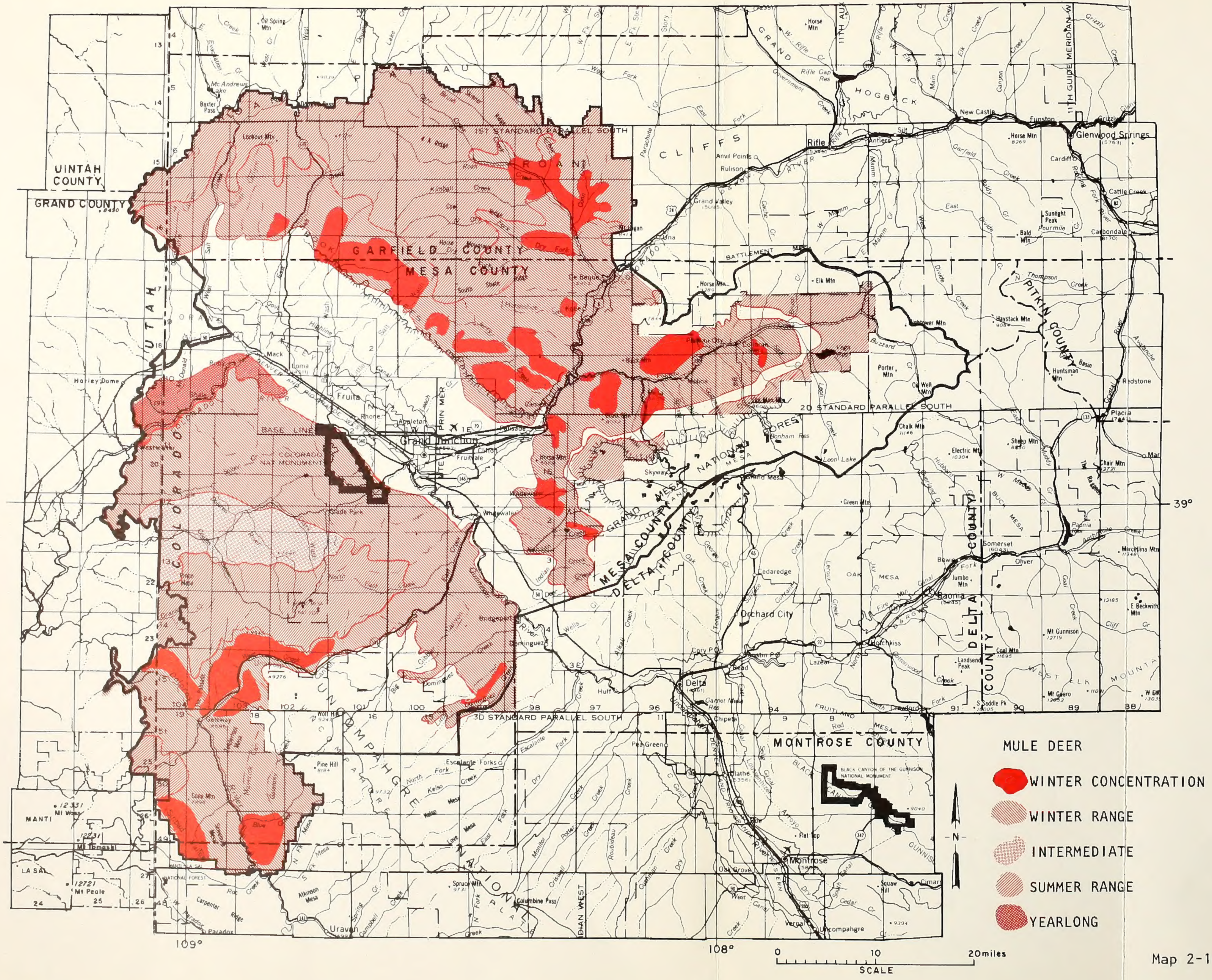
PRONGHORN ANTELOPE

Pronghorn antelope were first introduced in 1949, when 36 animals were released in the Wells Gulch area just across the Delta County line. Since that first introduction, the herd has increased so that the area supports approximately 50 animals in the Kannah Creek Allotment.

An additional 30 to 40 animals inhabit an area northwest of Grand Junction (see map 2-13). These animals are the result of a Colorado DOW transplant which took place in January 1968. The herd is apparently in a downward trend, with most animals concentrated near the Utah border.

Pronghorns are dependent upon public lands twelve months a year. DOW GMU's 30 and 41 encompass the entire range, approximately 158,000 acres of public land.

Pronghorn habitat consists primarily of the desert shrub type, with small amounts of pinyon-juniper and grassland types. A kidding ground has been identified east of Highway 50 on the Kannah Creek Allotment (see map 2-13).



Map 2-11. Mule Deer Distribution

TABLE 2-10

CRUCIAL DEER WINTER AREAS

AREA	TOTAL ACRES	ACRES PUBLIC LAND	PERCENTAGE	ALLOTMENT AND GRAZING SYSTEM1/	LIVESTOCK KIND	CURRENT SEASON OF USE	ESTIMATED WINTER DEER POPULATION
Whitewater Creek	4,000	2,600	65	203 Whitewater Common Use (DR)	C	10/01 - 01/31 04/15 - 06/17 10/11 - 01/31	300
Rapid Creek	1,975	1,530	78	835 Lower Rapid-Cottonwood (DR) 835a Rapid Creek 835b Cottonwood	C C C	05/16 - 10/31 04/15 - 05/15	200
Chalk Mountain	5,300	2,700	51	808 White Mountain C.U. (DR) 809 Wild Country (DR) 842 Nichols Ind. (LI)	C C C	04/16 - 06/15 04/01 - 06/15 04/20 - 06/10	400
Cobert Flats	510	360	70	809 Wild Country (DR) 810 Alexander (LI) 819 Erven (LI)	C C C	04/01 - 06/15 06/01 - 09/15 05/01 - 10/31	100
Beehive	2,500	1,000	40	807 Spring Creek (DR)	C	05/20 - 06/30 10/01 - 11/14	150
Red Mountain	1,250	1,000	80	813 Red Mountain (LI) 820 Gapter Ind. (LI) 846 Robbins Ind. (LI)	S C C	05/10 - 06/30 05/01 - 06/15 10/16 - 11/30 05/01 - 05/30	50
Place Mesa	11,400	2,500	22	837 Heely Ind. (LI) 847 Jerry Gulch (DR)	C S	04/01 - 05/31 04/15 - 05/31	2,000
Conn Creek	17,280	10,240	59	706 Burdick East of Ranch (DR) 706b Tater Hills (DR) 752b West of Logan Wash 710b Ind. East of Ranch 710a Conn Creek (RR) 710c McCurdy Wash 710e 710f 724 Kimball (RR) 724b Kimball Mountain 724c 750 Webber (LI) 728 Kimball Foothills (LI) 720 Etcheverry (LI)	C C C C C C C C C C	04/16 - 05/31 05/10 - 06/09 04/01 - 05/31 05/01 - 05/30 11/01 - 12/15 03/01 - 03/31 04/01 - 04/30 06/16 - 10/15 05/01 - 05/31 10/01 - 11/15 05/16 - 06/15 10/01 - 10/15 05/01 - 06/10 10/01 - 11/30	1,000 - 2,000
Dry Fork	5,120	5,120	100	710 Rodeo Grounds (RR) 710b East Spears C.U. 710c	C	04/16 - 05/31 11/01 - 12/15	400

TABLE 2-10 (Continued)

CRUCIAL DEER WINTER AREAS

AREA	TOTAL ACRES	ACRES PUBLIC LAND	PERCENTAGE	ALLOTMENT AND GRAZING SYSTEM1/	LIVESTOCK KIND	CURRENT SEASON OF USE	ESTIMATED WINTER DEER POPULATION
				710d 710e 732 Logan End (DR) 703 Spears (RR) 703a 703b 703c 703d 703e 703f 703g 703h	C	05/01 - 06/13 11/01 - 12/15	
Coon Hollow	1,200	1,200	100	712 Coon Hollow C.U. (RR) 754 Whittaker Flats (DR)	C C S	04/06 - 06/10 11/01 - 12/31 11/15 - 02/28 01/03 - 02/28	
Deer Park	7,040	5,760	82	713 Winter Flats (BP)	C	03/10 - 06/15 11/16 - 02/28	
Asbury	2,350	2,350	100	713 Winter Flats (RP) 754 Whittaker Flats (DR)	C C S	03/10 - 06/15 11/16 - 02/28 11/15 - 02/28 01/03 - 02/28	
Bookcliff	Little Book Cliff Wild Horse Area		No Livestock Grazing				
Bookcliff	8,100	8,100					500
Round Mountain	4,200	4,000	95	745 Round Mtn. (RR)	C C	04/15 - 06/15 10/01 - 11/31	
Hunter Wash	2,000	1,700	85	745 Round Mtn. (RR) 704E Corcoran Wash (RR) 501E Big Salt (RR) 502D Coal Gulch & Roan Creek (RR) 507 Little Salt (RR)	C C C C	04/15 - 06/15 10/01 - 11/30 05/01 - 06/30 09/01 - 11/30	
Coal Gulch	18,688	18,688	100	501E Big Salt (RR) 502D Coal Gulch & Roan Creek (RR) 507 Little Salt (RR)	C C C	07/01 - 12/15 05/09 - 11/07 03/01 - 05/31 12/01 - 02/28	900
Big Salt	4,800	4,800	100	501 Big Salt (RR) 503a (DR) 503b	C S	04/01 - 12/15 03/01 - 05/20 10/21 - 02/28	550

TABLE 2-10 (Continued)

CRUCIAL DEER WINTER AREAS

AREA	TOTAL ACRES	ACRES PUBLIC LAND	PERCENTAGE	ALLOTMENT AND GRAZING SYSTEM1/	LIVESTOCK KIND	CURRENT SEASON OF USE	ESTIMATED WINTER DEER POPULATION
Sinbad Valley	12,100	9,000	74	409 Sinbad Valley (DR)	C	03/01 - 05/25 10/20 - 02/18	150
Blue Mesa	11,150	11,000	99	406 Blue Mesa (DR)	C	11/16 - 06/15	400
Ute Creek Common North Creek	7,300	7,000	96	410 Ute Creek (DR) 416 North Creek (DR)	C C	02/01 - 06/03 10/15 - 12/03 12/01 - 01/15 04/01 - 05/15	200
N.W. of Gateway	7,250	7,150	99	401 Palisade Flats (RR)	C	12/01 - 12/31 02/01 - 02/28 04/10 - 05/25	in Unaweep
				145 Dugway (DR) 145d Gateway (DR)	C C	04/21 - 05/20 04/20 - 05/19 04/21 - 05/20 10/20 - 12/19 11/01 - 12/24	
Unaweep Canyon	19,500	16,000	82	151 Pine Ridge (LI) 402 Bull Draw Common (DR)	C C	05/25 - 10/31 04/27 - 05/26 10/17 - 11/31	1,500 - 2,000
				405 Wright Draw (DR)	C	05/16 - 05/24 10/16 - 12/25	
				416 North Creek (DR)	C	04/01 - 05/15 12/01 - 01/15	
				417 Unaweep North (LI)	C	03/01 - 05/31 11/01 - 02/28	
				418 Unaweep South (LI)	C	04/01 - 05/31 10/16 - 12/31	
				421 Mule Trail (LI) 423 EHL & West Creek (LI) 426 North Unaweep (LI) 427 Turner Gulch (LI) 428 Nelson Ranch (LI)	C C C C C	12/11 - 01/10 02/01 - 03/31 03/01 - 03/31 05/01 - 06/31 05/01 - 05/28 11/15 - 12/16	
Little Dominguez Canyon	1,950	1,950	100	302E Wagon Park Common (RR)	C	05/01 - 05/31 10/16 - 11/15	100
Kannah Creek2/	970	590	60	202 Kannah Creek (RR)	C	05/01 - 06/30	100

TABLE 2-10 (Continued)

CRUCIAL DEER WINTER AREAS

AREA	TOTAL ACRES	ACRES PUBLIC LAND	PERCENTAGE	ALLOTMENT AND GRAZING SYSTEM[1]	LIVESTOCK KIND	CURRENT SEASON OF USE	ESTIMATED WINTER DEER POPULATION
				503c		05/01 - 10/31	
				503d		Non-use	
				503e	C		
				505 Buniger (DR)			
Howard Canyon	1,600	1,600	100	602E East Salt (RR)	C	03/01 - 02/28	450
					H	08/01 - 08/30	
Lost Canyon	3,000	2,900	97	154 Lost Canyon (DR)	H	11/01 - 03/31	450
				154a Lost Canyon	C	05/01 - 06/15	
						11/01 - 05/31	
						12/20 - 03/31	

NOTE: Areas receive concentrated deer use from October 15 to March 15; these dates vary, depending on severity of weather.

[1] DR = deferred rotation, RR = rest rotation, BP = best pasture, LI = less intensive, and E = existing AMP.

[2] The portion of Kannah Creek Allotment constituting Kannah Creek Deer Range is isolated from the main body of the allotment and therefore may not receive the livestock use indicated.

TABLE 2-11

SEASONAL FOODS OF MULE DEER

(near Fort Garland, Colorado)

Class of Forage	Seasonal Diets (%) Winter	Spring	Summer	Autumn
Tree	23	14	7	14
Shrub & half-shrub	70	74	38	77
Forb	2	4	12	0
Grass	5	8	43	9
Total percent	100	100	100	100

SOURCE: Hansen and Reid 1975, p. 45.

TABLE 2-12

ELK POPULATION STATUS

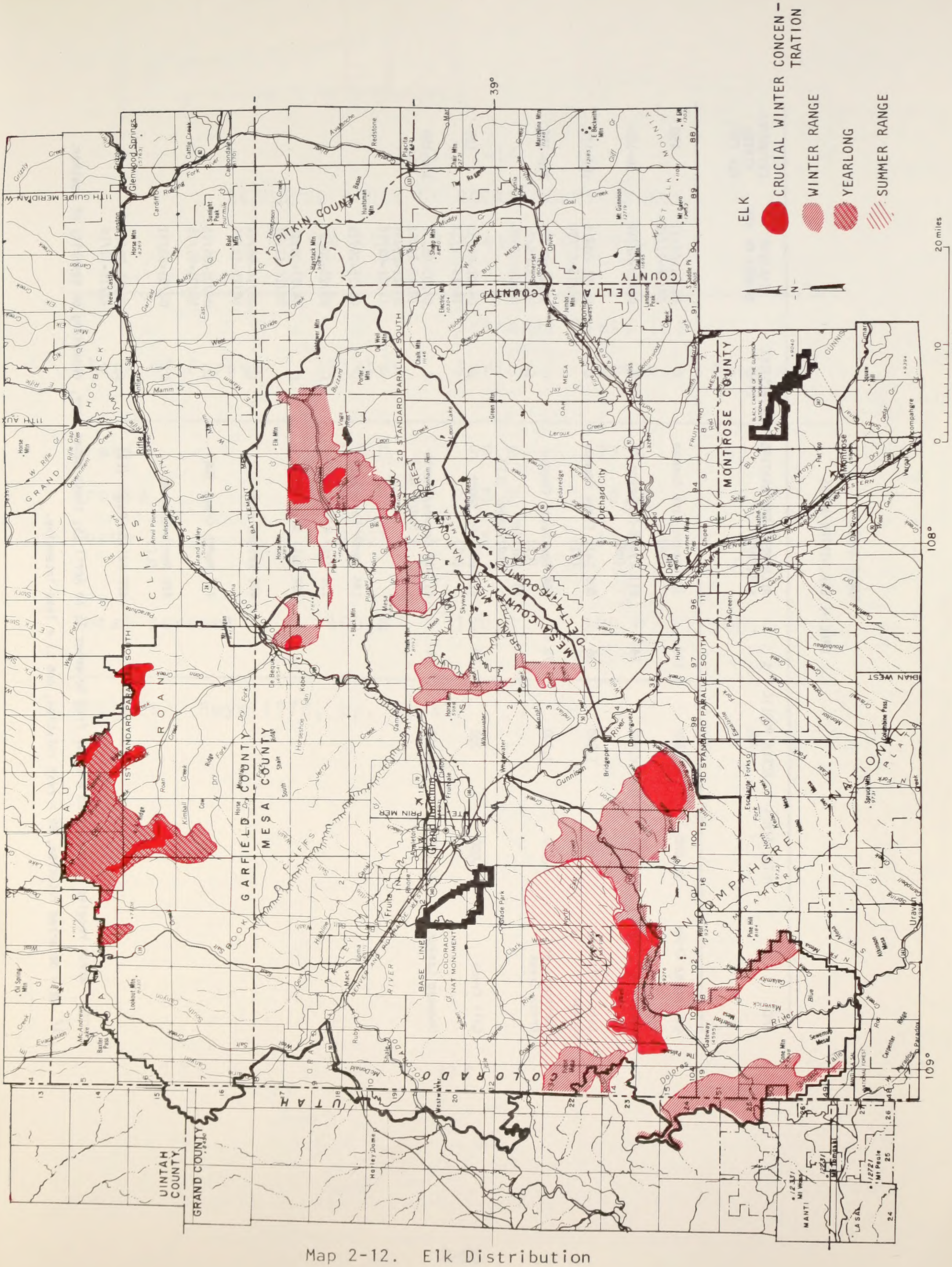
	GAME MANAGEMENT UNITS1/								
	30	31	40	41	42	60	61	62	Totals
Estimated Total Population2/	<100	150	448	2032	7079		686	1600	>11,995
Estimated Population on Public Lands in the ES Area3/	<67	88	208	621	766		133	170	> 1,986

NOTE: These estimates are the result of a newly developed computer model and, as such, are subject to change.

1/ See map 2-9.

2/ Population as of 1 June 1977. Estimates from DOW computer population simulation program developed by Charles Gross of CSU.

3/ The portion of the estimated total population allotted use on public lands within the ES area.



Map 2-12. Elk Distribution

TABLE 2-13

CRUCIAL ELK WINTER AREAS

AREA	TOTAL ACRES	ACRES PUBLIC LAND	%	ALLOTMENT AND GRAZING SYSTEM[1]	LIVESTOCK KIND	CURRENT SEASON OF USE	ESTIMATED WINTER ELK POP.
Dominguez Creek	12,600	12,600	100	302 Wagon Park Common (RR)	C	05/01-05/31 10/16-11/15	150
Horsethief Creek	7,600	6,400	84	811 Lyons-Anderson (DR)	S	01/23-02/19	50-150
Salt & Plateau Creek	2,500	1,300	35	806 Salt Creek Common (LI)	C	05/01-06/15 06/15-07/30	100-125
Hawxhurst and Brush Creek	4,500	3,400	76	804 Hawkhurst Common (LI) 839 Collier Individual (LI)	C C	05/01-06/15 06/16-08/31 06/15-10/15	200-300
Gill Creek	1,000	300	30	418 Unaweep South (LI)	C	04/01-05/31 10/16-12/31	125
Unaweep Canyon	16,700	14,100	84	417-18 Unaweep North & South (LI)	C	04/01-05/31 10/16-12/31 03/01-05/31 11/01-02/28	300-350
				146 North Fork (LI)	C	06/15-09/28	
				151 Pine Ridge (LI)	C	05/25-10/31	
				402 Bull Draw (DR)	C	04/27-05/26 10/16-11/31	
				405 Wright Draw (DR)	C	05/16-05/24 10/16-12/25	
				416 North Creek (DR)	C	04/01-05/15 12/01-01/15	
				426 North Unaweep (LI)	C	03/01-03/31	
				428 Nelson Ranch (LI)	C	05/01-05/28 11/15-12/16	

NOTE: Areas receive concentrated elk use from November 15 to April 15; these dates vary, depending on severity of weather.

[1] DR = deferred rotation, RR = rest rotation, and LI = less intensive.

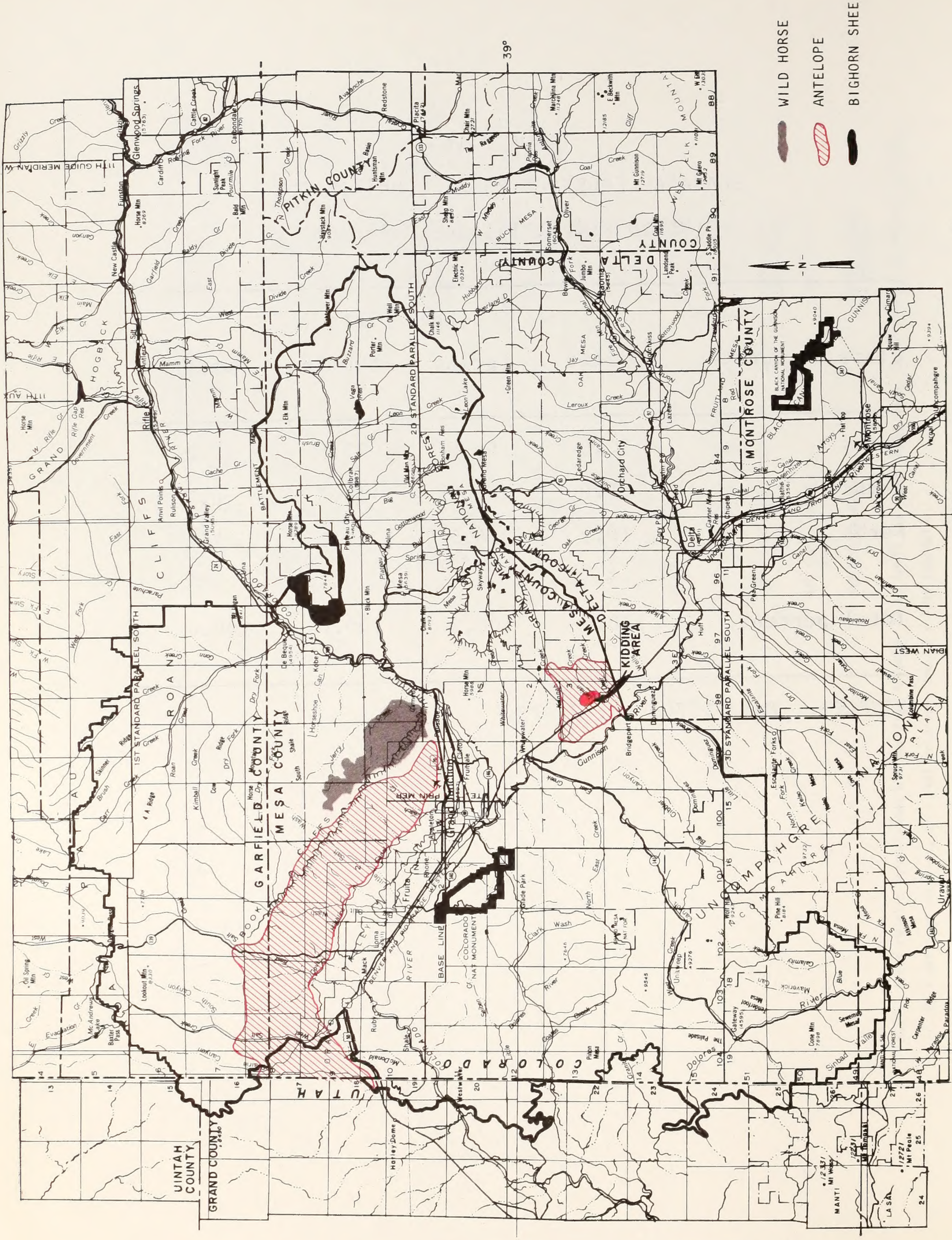
TABLE 2-14

SEASONAL FOODS OF ROCKY MOUNTAIN ELK

(White River Plateau, Colorado)

Class of Forage	Seasonal Diets (%)			
	Winter	Spring	Summer	Autumn
Grass	33.0	59.6	77.6	92.2
Browse	56.9	33.9	10.3	6.1
Forbs	10.1	6.5	12.1	1.7
Total percent	100.0	100.0	100.0	100.0

SOURCE: Boyd 1970, pp. 31-33.



Map 2-13. Wildhorse, Antelope, and Bighorn Sheep Distribution

Little work has been done in the ES area dealing with food habits of resident pronghorns. Considerable work has been done in surrounding areas, however. Hoover, Till, and Ogilvie (1959) report that antelope on the desert shrub type in Moffat County consumed 37.0 percent browse, 60.1 percent forbs, 1.1 percent grasses, and 1.8 percent cacti in September. Other studies (table 2-15) report a higher dependence on browse. Hoover, et al. (1959) report plants taken in largest quantities to be sagebrush, rabbitbrush, buckwheat, snakeweed, evening primrose, prickly pear, bitterbrush, and wheat.

BIGHORN SHEEP

Only one herd of Bighorn remains in the ES area. This population occurs on Battlement Mesa (map 2-13). Population estimates place the herd at 30 to 50 animals. They inhabit National Forest lands for the most part, but may range on adjacent public lands during the winter.

The present herd is thought to be static or slightly increasing. Historically, the herd probably numbered 200 to 300 animals, but, like other herds in the state, has declined in size and range.

Competition between bighorn and domestic sheep may occur on winter ranges. However, this is probably minor since it is felt that the Battlement Mesa herd is at or near present carrying capacity (Bear and Jones 1973).

A study conducted by the Colorado Division of Wildlife on the Sheep Creek-Trickle Mountain herd indicates grasses and grasslike plants (sedges) to be the most important component of the bighorn's diet, followed closely by browse species (Todd and Hansen 1973). Forbs are of minor importance.

COMPETITION BETWEEN UNGULATES

Whenever the ranges of any of the large grazing animals overlap, competition for food is expected (Wiens 1977). The degree to which this competition exists depends on the time of year each species is present, diet similarity, availability of preferred forage species, numbers of each species of grazing animals, duration of time each species is present on the range, and the degree to which the ranges overlap. The degree to which competition exists, based on diet similarities, has been summarized for four species by Hansen and Reid (1975). These results are shown in table 2-16.

Competition within a species is greater than competition between species since the niches occupied by individuals of the same species are identical. The following discussion addresses only the major points of competition by season.

Winter

Due to higher energy demands brought about by low temperature extremes, carrying young, and the need to range further to find adequate forage, winter is the most severe time of year. The most serious competition at this time is between pronghorns and both sheep and deer. The range overlap in both cases is small, but diets are quite similar. Additional competition between wildlife and livestock can be noted in tables 2-10 and 2-13 by noting where livestock are on wildlife crucial range during winter months.

Spring

As new green forage becomes available, all species come into some degree of competition with one another wherever ranges overlap. Competition is most severe between deer and sheep due to diet similarites. Elk and cattle competition can increase, but elk are generally moving to Forest Service lands as cattle are introduced. However, in years of late snowmelt cattle-elk competition can be major.

Summer

By summer most elk and bighorn have left the ES area, and most livestock are off the antelope range. Competition exists primarily between deer and cattle. This is probably minor since diets are dissimilar. Some competition between sheep and deer on Bangs Canyon and Timber Ridge Allotments is likely.

Fall

Competition probably increases somewhat between pronghorns and cattle as livestock are moved onto antelope areas in the fall.

Additional Cattle-Elk Conflict

Many recent papers have indicated that an additional conflict between cattle and elk, one of social interaction, may occur, (Pengelly 1977, Lonner 1976, Nelson and Burnell 1976, Knowles 1975, Mackie 1970, Skovlin et al. 1968, Dalke et al. 1965). This is not to say that elk and cattle will never be in the same area. However, research indicates a social interaction: elk use diminishes as cattle enter an area.

Large Mammals: Non-ungulates

MOUNTAIN LIONS

A small but stable population of mountain lions inhabits the ES area. The entire area is inhabited except, perhaps, the open desert shrub types around Whitewater and the Grand Valley between the Book Cliffs and the Colorado River. The densest population occurs in the Book Cliffs northwest of Grand Junction.

TABLE 2-15

SEASONAL FOODS OF PRONGHORN ANTELOPE

(in Saguache County, Colorado)

	Seasonal Diets (%)		
Class of Forage	Spring	Summer	Fall and Winter
Shrub	67	53	94
Forb	31	44	3
Grass	1	1	1
Total percent	99	98	98

SOURCE: Bear 1973, pp. 44-45.

TABLE 2-16

OVERLAP IN FORAGE UTILIZATION

Animal and Season Computed	Percent Overlap[1]
Pronghorn Summer and Pronghorn Winter	73
Pronghorn Summer and Cattle Summer	9
Pronghorn Summer and Cattle Winter	16
Pronghorn Summer and Deer Winter	78
Pronghorn Summer and Elk Winter	19
Pronghorn Winter and Cattle Summer	2
Pronghorn Winter and Cattle Winter	11
Pronghorn Winter and Deer Winter	78
Pronghorn Winter and Elk Winter	10
Cattle Summer and Cattle Winter	56
Cattle Summer and Deer Winter	7
Cattle Summer and Elk Winter	10
Cattle Winter and Deer Winter	14
Cattle Winter and Elk Winter	24
Deer Winter and Elk Winter	31

SOURCE: Hansen 1975.

1/ A 73 percent overlap means that, of all the species of plants comprising two different animal diets, 73 percent of the frequencies of plant species will be common to both diets.

Mule deer are the primary prey of mountain lion, with individual lions taking about 50 deer annually (Whitewater URA). Although lions may limit rapid population increases, they are not considered to be limiting on deer populations in this area.

BLACK BEAR

The population of black bear is stable to slightly increasing. They inhabit the more remote areas, with the best areas being on adjacent Forest Service lands. Bear move to lower elevation public lands during two periods of the year: early spring and midsummer. These animals are largely vegetarian. Bears graze the young spring growth of cool season grasses and forbs.

COYOTES AND BOBCATS

These two medium-sized mammals have, in recent years, become important in the fur trade. The coyote is very common and the bobcat, though far less common and reduced by trapping, does not appear to be a threatened species.

Cottontails and rock squirrels are probably the dietary mainstays of both carnivores. Coyotes may occasionally prey upon small domestic animals.

Small Mammals

Information on small mammals occurring in the ES area based upon trapping records is given in appendix 7. Harvest data for furbearers and other small mammals is available at the Grand Junction District Office.

SMALL GAME SPECIES

Although many species are hunted occasionally for food, the three major species hunted are the mountain cottontail rabbit, desert cottontail rabbit, and snowshoe hare. The mountain cottontail generally inhabits forested areas above 6,000 feet. Optimal habitat consists of forest edge types with good brush cover. The desert cottontail, on the other hand, generally occurs below 6,500 to 7,000 feet. Preferred habitat is brushlands and woodland edge situations in canyons and valleys or on mesas. Snowshoe hares occur above 8,000 feet, where coniferous forests become dominant. Optimal cover consists of forest openings with good stands of brush.

These species rely on green herbaceous plants, although, during the winter, twigs of woody species will be used. Some observers have reported use of prickly pear by cottontail rabbits (Martin et al. 1951). The three species are prey for both raptors and ground predators.

OTHER SPECIES

Species not hunted are not as important economically, so little data is available on them. Collectively, these animals, especially the rodents and lagomorphs, consume large amounts of forage and therefore are in competition with livestock (Stoddart and Smith 1955).

Birds

Information on birds in the ES area is presented in appendix 7. Harvest data for waterfowl and upland game birds is available at the Grand Junction District Office. Little other population data is available.

WATERFOWL

Waterfowl are not abundant in the ES area, although the area is used as a stopover during migrations. A population of Canada Geese has been established by DOW personnel on the Colorado and Gunnison Rivers. A breeding population has been expanding up the Dolores River into Colorado.

Mallards are the most common ducks nesting in the area, with an occasional green-wing and cinnamon teal. Mallards are the most common winter species as well, with pintail, green-winged teal, ring-necked duck, common goldeneye, and common merganser also common. A large influx of waterfowl occurs during the early spring, resulting in nearly all open water areas being used.

UPLAND GAME BIRDS

A number of upland game birds occur in the area. Gambel's quail and ring-necked pheasants are highly dependent on agricultural lands, while other species are more widely distributed. Table 2-17 lists the important upland species; map 2-14 shows the distribution of sage, sharptail, and blue grouse.

RAPTORS

A recent raptor inventory of the ES area (Enderson 1977) rated golden eagles and prairie falcons as the most common cliff nesting raptors. Other year-round residents are the sharp-shinned hawk, Cooper's hawk, red-tailed hawk, marsh hawk, American kestrel, great horned owl, pigmy owl, long-eared owl, and saw-whet owl (Davis 1969). The bald eagle, which has recently been added to the Federal Endangered Species List, is a common winter resident. The rough-legged hawk, which is less abundant, is also a winter visitor. The Swainson's Hawk is an uncommon summer resident. The endangered peregrine falcon is a rare bird summering in the ES area.

The prey on which these raptors are dependent are insects, small rodents, rabbits, prairie dogs, birds, and carcasses of larger mammals.

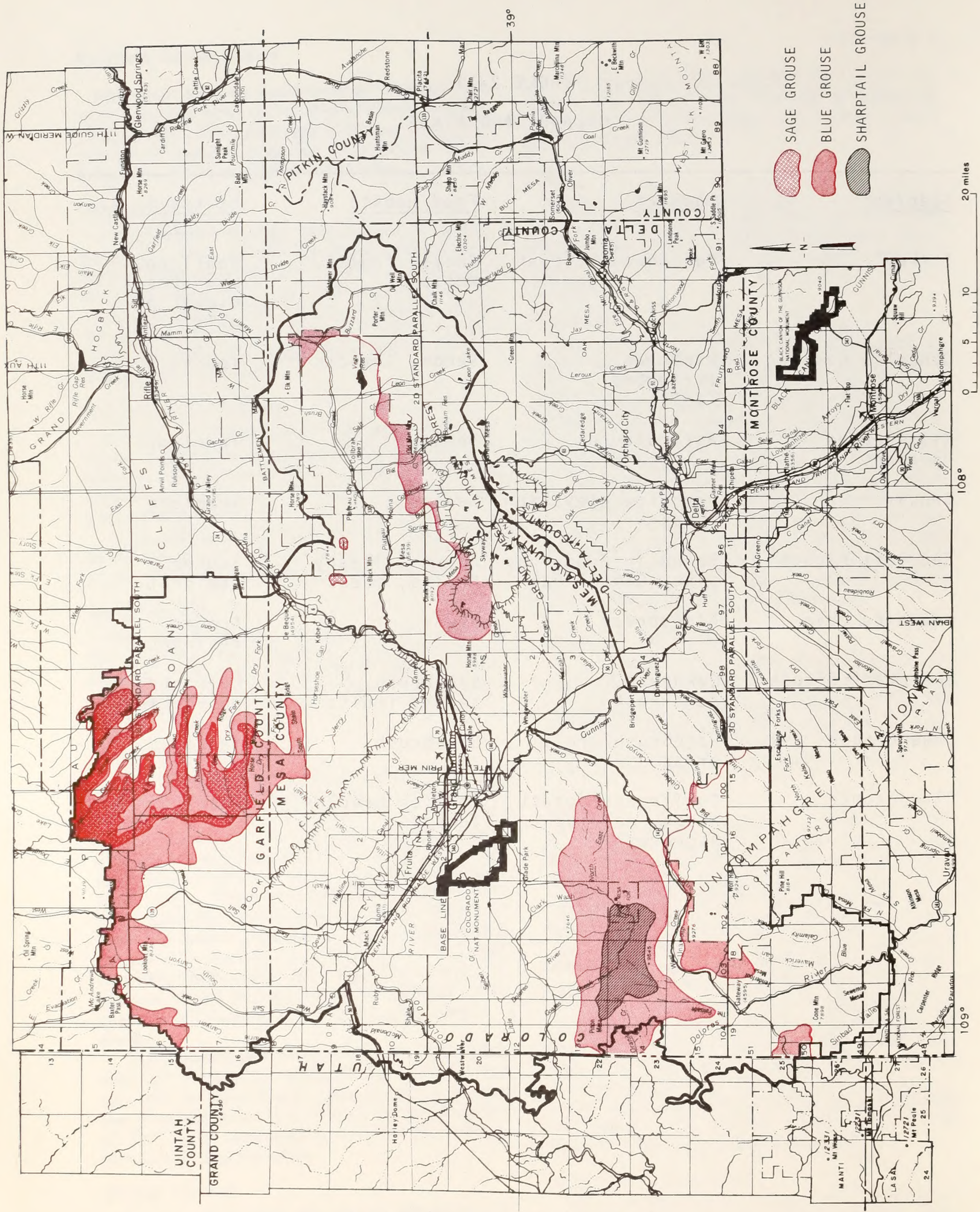
OTHER NONGAME BIRDS

A list of birds known to occur in the ES area is available at the Grand Junction District Office.

TABLE 2-17

UPLAND GAME BIRDS

Species	Habitat	Food Habits	Status in ES Area
Turkey	Coniferous forest	Seeds, fruits, masts	Yearlong, migrates elevationally
Gambel's Quail	Riparian, Irrigated fields	Seeds, insects	Yearlong
Ring-Necked Pheasant	Agricultural	Seeds	Yearlong
Chukar	Dry, low elevation areas	Seeds	Yearlong
Sandtail Pigeon	Breed in ponderosa pine, Gambel Oak	Acorns, fleshy fruits, seeds	Summer resident
Mourning Dove	Widespread	Seeds	Summer resident
Sharptail Grouse	Oakbrush, sagebrush	Sagebrush, seeds, fruits	Remnant population
Sage Grouse	Sagebrush/grass areas	Sagebrush	Yearlong
Blue Grouse	Coniferous forest, aspen, oakbrush sagebrush	Conifer needles, acorns	Yearlong



Map 2-14. Grouse Distribution

Little objective information is available as to the population status of most of these species.

Reptiles and Amphibians

Information on reptiles and amphibians which are thought to occur in the ES area and the habitat types with which they are usually associated is presented in appendix 7. The only species of any economic import in the area is the tiger salamander. Although its distribution is probably much wider, it is only known to occur in stock ponds in the Sunnyside and Winter Flats areas. It is widely used in the larval stage as bass bait.

Arthropods

A list of insects and other arthropods common to the ES area is available at the Grand Junction District Office. Two species of butterflies are noteworthy due to their rarity.

The Great Basin Silverspot, a fritillary, occurs on a natural spring area in Unaweep Canyon. Only one other population is known to occur in Colorado, and the species has been proposed for inclusion on the Federal Endangered or Threatened Species List. It is apparently a relict species from an earlier, wetter climatic period and now survives only on widely scattered spring areas. The larval stage of this butterfly feeds exclusively on meadow violet, which is also restricted to the Unaweep Canyon. Further information on this species is available at the Grand Junction District Office.

A rare subspecies of the short-tailed black swallowtail occurs in the Black Ridge area of Glade Park (Eff 1962). This butterfly has recently been collected in Delta County (personal communication, Eff 1977) but is still considered to be quite rare. The larvae feed on a plant known as Indian root (*Lomatium eastwoodae*), which has been proposed for the Federal Endangered Species List. This plant is restricted to canyon walls in the Black Ridge area.

Aquatic and Riparian Wildlife Habitat

Both aquatic and riparian habitat in the ES area are limited by existing natural and man-related conditions. The arid climate, with its high evaporation rate, seasonal thunderstorms, and high sediment yields, combined with the many water diversions for domestic and agricultural use, have created an environment unconducive to extensive aquatic and riparian communities. Grazing practices have also had a detrimental effect. Appendix 11 summarizes information currently available on the condition and extent of the aquatic and riparian habitats in the proposed allotment areas. Map 2-15 shows the location of the major aquatic and riparian habitat.

Most of the aquatic and riparian habitat on public land is composed of small streams with narrow, distinct riparian zones. A list of the fish, invertebrates, and riparian vegetation is available at the Grand Junction District Office.

Few waters on public land in the area are capable of sustaining a natural reproducing population of game fish. The area is therefore stocked with both warm and cold water game fish by the Colorado Division of Wildlife to augment marginal streams and create a fishery in an otherwise barren water. A summary of the stocking and catch rates for the area is available at the Grand Junction BLM District Office.

Riparian habitat in the area has an importance to aquatic and terrestrial species disproportionate to its size (0.3μ of the vegetative type). These areas provide a plant and animal diversity in sharp contrast to the surrounding arid region by supporting a different vegetative type and providing a unique microhabitat for invertebrates, birds, amphibians, mammals, and fish. Animals from the outlying region also depend on riparian zones for water, food, and shelter as well as for routes for travel and dispersal to other habitat types (Thomas et al. 1976). Riparian areas are currently grazed by livestock and are considered as part of the AUMs available in the various allotments.

Threatened and Endangered Species

A number of species occur in the ES area which are listed on either the Federal or Colorado Threatened and Endangered Species List or which are protected throughout the State.

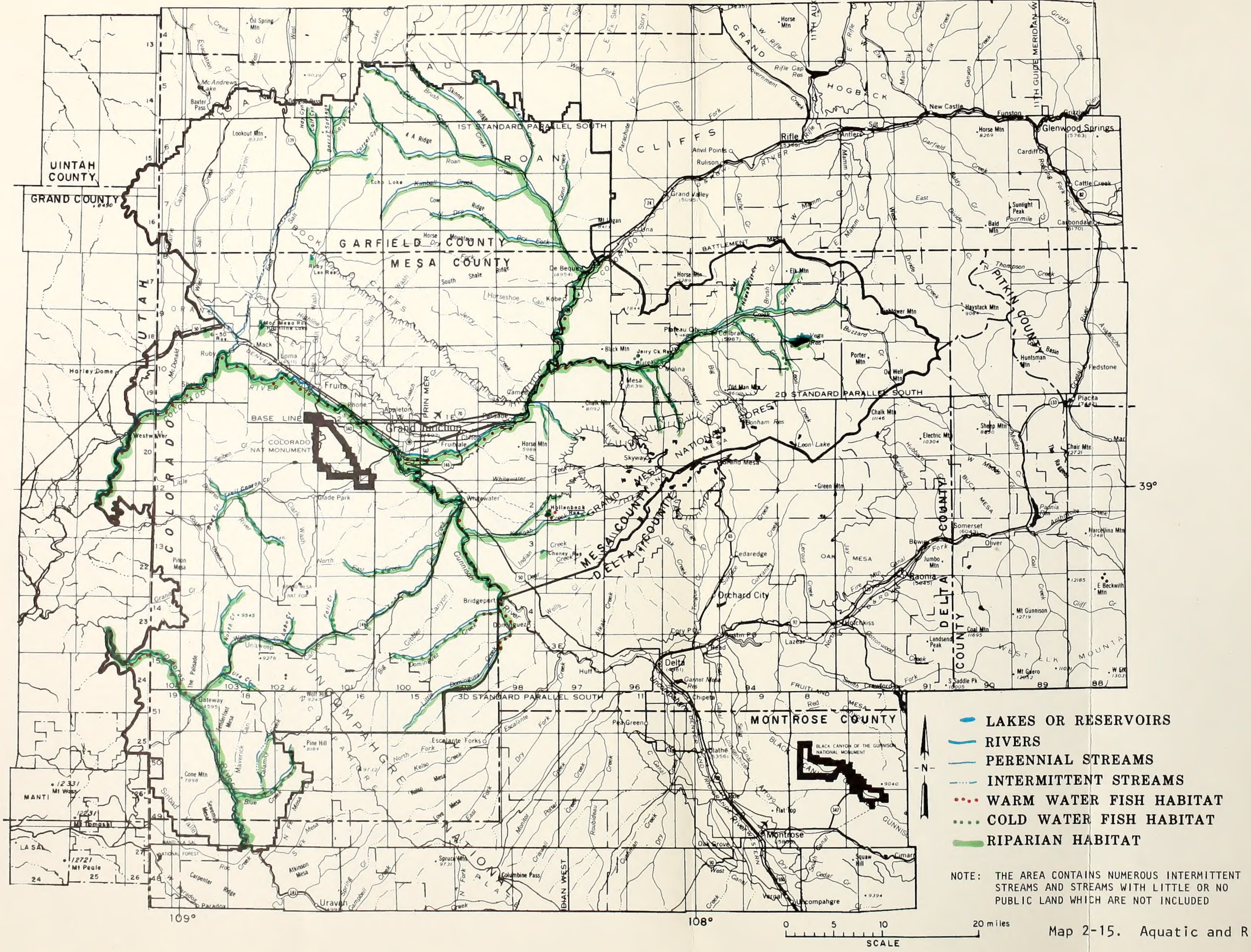
There are no confirmed sightings of black-footed ferrets, although there are a number of prairie dog towns in the area, which the ferret requires.

No river otters are currently present in the ES area. However, fifteen otters were recently released in the upper Gunnison River. These may eventually occupy portions of the Gunnison and Colorado Rivers in the ES area.

Bald eagles winter in the area. This species has recently been added to the Federal Endangered Species List. The major river and stream bottomlands are the center of bald eagle activity.

A recent raptor survey has identified areas of potential peregrine falcon habitat. Recently, confirmed sightings were made of two pairs of nesting peregrines.

The National Audubon Society maintains 'The Blue List' of bird species that appear to be experiencing long-term, noncyclical population declines. "The Blue List' is essentially an early warning system' (Arbib 1977). Of the 59 species on the 1978 list, 15 are breeding species which occur in the ES area and which appear to meet Blue List criteria in this region of the United States. These include the Black-crowned night heron, Sharp-shinned hawk, Cooper's hawk, Swainson's hawk, Ferruginous



NOTE: THE AREA CONTAINS NUMEROUS INTERMITTENT STREAMS AND STREAMS WITH LITTLE OR NO PUBLIC LAND WHICH ARE NOT INCLUDED

Map 2-15. Aquatic and Riparian Habitat

hawk, Sharp-tailed grouse, Sage grouse, Black tern, Yellow-billed cuckoo, Barn owl, Burrowing owl, Lewis' woodpecker, Western bluebird, Loggerhead shrike, and Vesper sparrow.

The greater sandhill crane passes through the ES area during its spring migration. Several observations of whooping cranes in association with the sandhills have been made in the past year. Presumably, these whooping cranes are part of the newly established Grays Lake population. Although occasional sandhill cranes stop to rest and feed around stock ponds between the Highline Canal and the Book Cliffs, whooping cranes have only been observed in flight.

The Great Basin silverspot (*Speyeria nokomis nokomis*) surviving in Unaweep Canyon has about 67 percent of its habitat on public land. This area has been proposed for designation as critical habitat. Mule deer, elk, and cattle make extensive use of the seepage area which constitutes the critical habitat.

There are two fish species listed by U.S. Fish and Wildlife Service as endangered: the Colorado River squawfish (*Ptychocheilus luciu*) and the humpback chub (*Gila cypha*). In addition, the Colorado Department of Natural Resources lists the bonytail chub (*Gila elegans*) and the humpback sucker (*Xyrauchen texanus*) as endangered. The U.S. Fish and Wildlife Service has proposed the bonytail chub for endangered status and the humpback sucker for threatened status (Federal Register 43:79:17375-17377).

The Colorado River is listed as critical habitat for squawfish. In the ES area, this river still seems to support self-maintaining populations of squawfish, humpback chub, and humpback suckers (Kidd 1976). The bonytail chub has been reported in the Gunnison and Colorado Rivers, but this has not been confirmed (Johnson 1976).

A number of species which occur in the ES area are on the Colorado State Protected List. These are listed in table 2-18.

Wild Horses

In 1977, 110-120 wild (feral) horses occupied a region known as the Little Book Cliff Wild Horse Area (see map 2-13). This area has been removed from livestock grazing but does lie within three crucial deer winter ranges. Due to a drought and an overpopulation of horses, a roundup was held recently in which 40 animals were removed to Rock Springs, Wyoming, for adoption. This reduction in numbers should balance grazing use with the carrying capacity of the range.

Fecal samples collected in the fall of 1977 indicated grass to be the major component of the diet at 75 percent. Browse was of secondary importance at 23 percent, while forbs made up only 2 percent of the fall diet.

Livestock grazing has been eliminated from the Little Book Cliff Wild Horse Area; the proposed action would therefore not impact the 27,065 acres reserved for wild horses. During severe winters the horses do use upper south facing slopes of the Bookcliffs which is adjacent but outside the wild horse area. Even though the horses periodically use these slopes there is no known competition with domestic livestock for the forage. The horses use portions of the slope not accessible to domestic livestock because of steepness and natural barriers.

Livestock Grazing

According to a 1977 preliminary agricultural census, there were an estimated 76,500 beef cattle and calves in the ES area (Colorado Department of Agriculture 1977). This figure represents an 18 percent decrease, which contributes to the overall 11 percent decrease in beef cattle and calves in Colorado. This is the fourth consecutive decline following annual increases from 1969 to 1973.

Sheep and lambs showed a 10 percent increase in the ES area from the 1975 census of approximately 57,300 to the 1977 estimated preliminary census of 63,500. These figures reflect only a local increase. Statewide, the number of sheep in Colorado has continued to decline despite industry concern and efforts to reverse the trend. The number of sheep documented in the 1977 preliminary census shows a 10 percent decrease in Colorado from the 1975 census (Colorado Department of Agriculture).

The overall number of livestock in the ES area has decreased from approximately 150,800 to an estimated 140,000, a 7 percent decline. Much of the decline may be attributed to residential development. Many recently developed acreages were historically used as livestock pasture land or cropland, with livestock utilizing crop aftermath. Residential development has reduced the number of small livestock operations in the ES area and has attributed to some of the decline in livestock numbers over the past years.

The estimated 140,000 beef cattle, calves, and stock sheep in the ES area equal 89,200 animal units. They require 1,070,400 AUMs of forage and supplements annually.

Livestock grazing on BLM-managed public lands in the ES area involves 140 livestock operators. Most of these operators have cow/calf, yearling, and/or sheep operations. A typical livestock operation involving private property and BLM-managed public land would involve livestock being wintered on private land from approximately November 1 to April 15 and then being grazing on

TABLE 2-18

SPECIES ON THE COLORADO STATE PROTECTED LIST

Mammals

All shrews and bats

Pika

Least Chipmunk and Colorado Chipmunk

White-tailed Antelope Squirrel

Golden-mantled Ground Squirrel

Northern Grasshopper Mouse

Desert Woodrat

Black-footed Ferret

River Otter

Amphibians and Reptiles

Utah Tiger Salamander

Yellow-headed Collared Lizard

Mountain Short-horned Lizard

Desert Short-horned Lizard

Western Smooth Greensnake

Great Plains Rat Snake

Great Basin Gopher Snake

Utah Milk Snake

Utah Black-headed Snake

Mesa Verde Night Snake

Midget Faded Rattlesnake

public lands and other private lands from about April 16 to October 31.

Several livestock operators are also dependent on the grazing of lands managed by the U.S. Forest Service (USFS). A typical grazing pattern using private land in conjunction with BLM- and USFS-managed lands would involve livestock being grazed on private land from about November 16 to March 31, BLM-managed land from April 1 to May 31, USFS-managed land from June 1 to September 30, and BLM-managed land from October 1 to November 15.

Where several livestock movements are necessary, as in the situation described above, operators must make several visits to their allotments not only for the gathering and moving of livestock, but also to distribute salt and supplements; for maintenance of fences, reservoirs, and other improvement projects; and to check on the general health and welfare of the livestock.

BLM records indicate total active qualifications in the area to be 94,822 AUMs. In 1977, licensed active use (including scheduled nonuse) was 88,576 AUMS (BLM Range Management Automated System, September 1977). The 6,263 AUM difference between active qualifications and licensed use was due to nonuse not shown on the licenses.

Allotments, class of livestock, seasons of use, and stocking rates have been established for each operator. Eleven AMPs covering 281,957 acres were developed prior to mid-1975. Three involving a total of 17,416 acres have been fully implemented.

The above information indicates that BLM-managed lands are not a major source of livestock forage for the ES area as a whole. It should be noted, however, that dependency on BLM lands for livestock grazing may be critical for the 140 livestock operators licensed by BLM annually. This includes the many operators who use public lands for short periods in an annual rotation between grazing on private lands in the winter, BLM lands in fall or spring, and USFS lands in summer.

Socioeconomic Conditions

The ES area includes portions of several counties in Colorado and Utah. In Colorado it includes most of Mesa County, part of western Garfield County, and a small part of northwest Montrose County. In Utah it includes small parts of east Grand County (see map 2-16).

With counties being the primary substate geopolitical entity for which socioeconomic data are reported, the analysis of socioeconomic conditions in this and subsequent chapters will be of Mesa County. It is recognized that slight variations in socioeconomic data may exist because of the ES area county configuration. However, Mesa County data or indicators are believed to accurately depict conditions in the ES area. Therefore, ES area social and economic considerations are synonymous with those of Mesa County for the purposes of exposition and analysis.

The social and economic impacts of livestock grazing on public lands appear relatively insignificant when compared to the ES area economy and society as a whole, but these impacts are much more important relatively as they affect the families of those holding BLM grazing privileges. Therefore, wherever possible, the social and economic analysis in this document will concentrate on this subset of the ES area population which is directly affected by livestock grazing on public lands. The ES area economy and society will be used as a base for relative comparison.

Population

Mesa County includes about 2.5 percent of Colorado's population, with the latest population estimate being 66,848 (1977 Special Census for Western Colorado Counties, U.S. Dept. of Commerce, Bureau of the Census).

The 138 operators who have grazing privileges on public lands and the families dependent on their 138 ranching operations make up an estimated population of 473 people. This group, which is directly affected by livestock grazing on public lands, comprises 0.7 percent of the 1977 Mesa County population.

Income

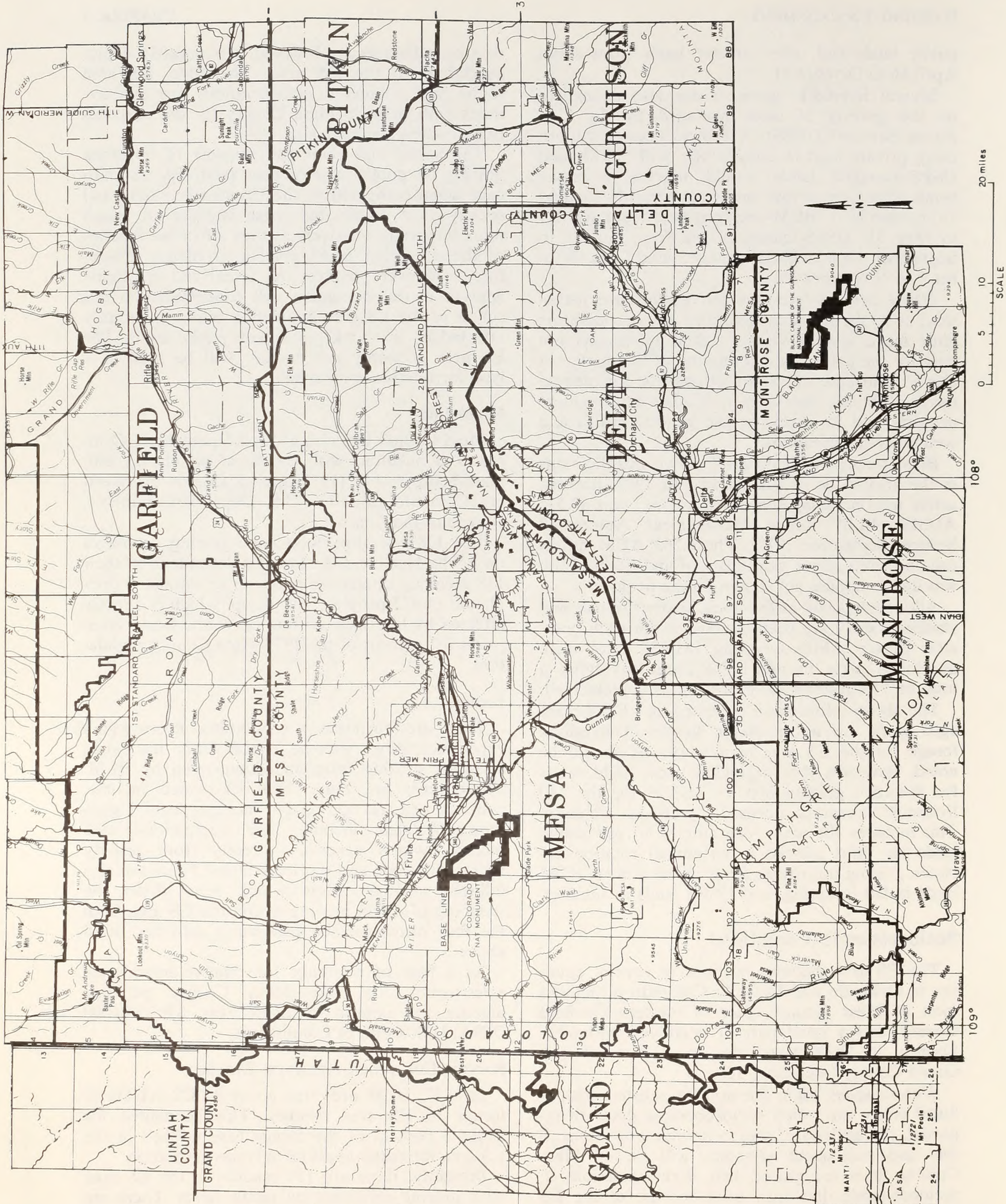
There are four areas of economic concern which experience direct income effects from the range livestock grazing program administered by BLM. These areas are range livestock-related income, contract construction-related income, federal government-related income, and recreation-related income, which generates directly from activity within the trade and service sectors. There are also indirect income effects which result from the spending of direct income within the ES area from the four direct income generating activities listed above.

As a base of reference for relative importance assessments, the 1976 Mesa County personal income for county residents was $363,340,000 (BEA, U.S. Dept. of Commerce).

RANGE LIVESTOCK-RELATED INCOME

In 1977, BLM provided about 94,822 AUMs of forage to ES area ranches. This accounted for about 8 percent of the forage base utilized in the ES area for range livestock income generation.

Presently, there are 138 ranches in the ES area with grazing privileges on public lands. There are 142 families which are dependent to varying de-



Map 2-16. Counties in the ES Area

grees on these ranches as their income source. Of the 142 families dependent on the ranches, it is estimated that 78 families (265 people) are dependent on ranching as their primary source of income.

This subset of the ES area population (142 families/473 people) is considered to be the group most directly affected by the BLM livestock grazing program. Therefore, the income generated by the 138 ranches upon which this group depends will be determined, and expected changes in this income base will be identified, for the proposed action and all alternatives.

To identify the income generated by the 138 ranches, it is necessary to group the ranches into different categories according to size and class of livestock. This is necessary since the scale of a livestock operation determines the net returns to that operation per annual unit of carrying capacity. Those net returns are considered to be income to the families dependent on these ranches.

Table 2-19 indicates the size categories into which the 138 ranching operations fall, average BLM forage use, gross revenue, and net revenue. Each of the eight models representing a size category was analyzed to determine the income characteristics resulting from ranch operations with present use levels of BLM forage (appendix 12). The aggregation of income produced by all 138 ranching operations indicates that these ranches are presently accounting for an estimated $10,021,756 in gross revenue. This level of sales by the livestock ranches influences business activity within the ES area in economic sectors other than the livestock sector. The business activity multiplier for the ES area is estimated to be 1.8 (The Economy of Northeastern Colorado, Description and Analysis, prepared for BLM by Colorado State University). This means that every dollar of sales by the livestock ranching sector generates an additional eighty cents of sales in other sectors. Applying this multiplier to the present $10,021,756 gross revenue indicates that the sales of these 138 ranches generate another $8,017,404 sales in the ES area economy.

The 138 ranches presently account for $1,331,981 net revenue annually. This is direct personal income for the ranch operators and their families. Applying the income multiplier 1.6 (BLM/SED) to the direct ranch income indicates a total direct plus indirect income effect of $2,131,170, which means that an additional $799,189 personal income is generated in the ES area as a result of the $1,331,981 direct personal income being spent. The total direct plus indirect income of $2,131,170 is 0.587 percent of 1976 Mesa County personal income.

As table 2-19 indicates, the small cattle ranches in the Model 1 category are experiencing negative net revenues. This means that on the average, these ranch operations are presently being subsidized from other family income sources. The estimates of non ranching income in table 2-19 reported in a current Colorado State University study discussed in appendix 12 would be the source for such a subsidization.

Table 2-20 indicates the relative dependency of ranches on BLM as a forage source for their operations. The ranching operations are affected to varying degrees by this dependency, depending upon the amount of dependency, the season the BLM forage is supplied, and the ease with which other forage could be substituted for the BLM forage if BLM forage were not available. These three factors were considered in order to make an estimate of the criticality of BLM supplied forage to the ranching operations. Table 2-21 indicates the number of ranches which were considered to have a high, medium, or low dependency on BLM forage.

CONSTRUCTION-RELATED INCOME

Since implementation of the proposed action would require some construction affecting the regional construction industry, it should be noted that 1976 contract construction-related personal income for Mesa County was $26,897,000 (U.S. Department of Commerce, Bureau of Economic Analysis). This was 7.4 percent of total personal income. With an income multiplier of 1.331 (BLM/SED) for this sector, the 1976 total direct and indirect income generated by contract construction was an estimated $35,799,907.

RECREATION-RELATED INCOME

Income resulting from recreation-related activities is generally included in other categories, primarily wholesale and retail trade and services. Tourism and recreation are important to the ES area economy even though specific data are not available to properly identify the magnitude of this importance. The ES area provides a considerable number of recreation-related opportunities, such as rodeos, cultural activities, hunting, fishing, hiking, general sightseeing, and others.

The economic impacts of all recreational activities are not currently known. However, a recent study by Colorado State University estimates that total 1973 expenditures by sportsmen in Region 11 (Moffat, Rio Blanco, Garfield, and Mesa Counties) was $34,370,960 (Ross, Blood, and Nobe 1975). It is possible that about 20 percent of these expenditures resulted in income to Region 11 residents. This $6,874,192 amounted to about 2 percent of 1973 Region 11 personal income. Since the Colorado State University study focused only on hunting and fishing activities and did not include all recreation- and tourism-related income, the real income

TABLE 2-19

RANCH SIZE AND INCOME EFFECTS

Model	Cattle	Sheep	Number of Ranches	Average BLM AUM Use per Ranch	Gross Revenue1/		Net Revenue1/		Non-Ranching2/ Income
					Per Ranch	All Ranches	Per Ranch	All Ranches	
I	0 to 249		70	184	$ 21,694	$ 1,518,580	$- 2,881	$- 201,670	$ 9,650
II	250 to 549		26	754	57,609	1,497,834	3,586	93,236	8,400
III	550 to 749		11	1,523	136,739	1,504,129	18,071	198,781	11,800
IV	750 or greater		14	2,038	247,286	3,462,004	61,097	855,358	37,038
V	0 to 220	0 to 1000	6	636	42,296	247,776	5,466	32,796	6,667
VI	221 to 1300	650 to 5400	5	1,780	267,425	1,337,125	62,737	313,685	7,000
VII		500 to 1249	3	241	41,436	124,308	2,279	6,837	7,500
VIII		1250 or greater	3	1,197	110,000	330,000	10,986	32,958	3,500
Total			138	94,822		$10,021,756		$1,331,981	

SOURCE: BLM Range Automated Data System, 1978, for ranch sizing.

NOTE: Income effects derived from analysis in appendix 12.

1/ Revenue of ranches with present BLM use levels.

2/ In the 1978 CSU ranch study, 91% of the sample for the southwest region of Colorado reported income from sources other than livestock ranching. These amounts are the average non-ranching income for those who reported other income.

TABLE 2-20

OPERATOR DEPENDENCY ON BLM GRAZING

Dependency (%)	Number of Ranches
0 to 10	71
11 to 20	22
21 to 30	19
31 to 40	10
41 to 50	10
51 to 60	2
61 to 70	0
71 to 80	1
81 to 90	2
91 to 100	1
Total	138

NOTE: To calculate dependency, estimates of total forage needs of the ranches were made and related to the contribution made to those forage needs by BLM.

TABLE 2-21

CRITICALITY OF RANCHER DEPENDENCY ON BLM GRAZING

Criticality	No. of Ranches	Percent of Total
High	50	36.2
Medium	45	32.6
Low	43	31.2
Total	138	100.0

NOTE: High means that BLM forage use is judged to be an essential element for the survival of the ranching operation. Medium means that BLM forage use may or may not be an essential survival element. Low means that BLM forage use is judged to not be essential to the ranching operation survival.

A judgmental estimate of the criticality of rancher dependency on public land grazing was made by BLM personnel by applying the following three criteria to each ranching operation:

1. Proportion of forage acquired on public land.
2. Season that forage is acquired.
3. Ease in acquiring alternate sources of forage.

effect of recreation is considerably larger. With data available only at the state planning and management region levels, it is difficult to determine what proportion of the income was retained within the ES area.

It is possible that recreation-related income is retained generally in proportion to total personal income, which would mean that about $4.5 million of Mesa County's 1973 income can be attributed directly to hunting- and fishing-related recreation. Subsequent sportsmen expenditure increases and expenditures from general recreational activities would add additional income to this amount.

GOVERNMENT-RELATED INCOME

The 1976 personal income in Mesa County resulting from total government employment (federal, state, and local) was $57,854,000. This amounted to 15.92 percent of total personal income. Federal government employment accounted for $14,747,000 of the total and, with an estimated income multiplier effect of 1.884 (BLM/SED), resulted in direct and indirect income of $27,783,348. This income, added to income from state and local government employment, which has an estimated income multiplier effect of 1.000 (BLM/SED) for the ES region, resulted in a total impact on personal income estimated to be $70,890,348.

Employment

It is expected that implementation of the proposed action could have a slight impact on employment in the ES area due to government personnel requirements, contract construction, recreation opportunities, and, ranch-related employment which is presently accounting for 146.62 man years of hired employment on the 138 ranches with BLM grazing privileges (appendix 12). Therefore, the following labor force information is presented to place any employment impacts discussed in this document in perspective.

The labor force increased in Mesa County from 21,306 (U.S. Census) in 1970 to 32,187 in May 1978 (Colorado Dept. of Labor and Employment). This represents a 51 percent increase in the labor force during this period.

As of May 1978, there were 1,612 of the labor force unemployed, for an unemployment rate of 5 percent. This rate is fairly close to that of the State of Colorado as a whole, which had an unemployment rate of 5.5 percent for the same time period.

Public Finance & Tax Base

Livestock carried on ranches is assessed for payment of local property taxes. Changes in county property tax will be estimated from changing herd values for the proposed action as well as the alternatives. Also, there is a direct relationship between the market value of ranches and their associated income-generating livestock carrying capacity. Since some alternatives considered in this ES would alter the allowable use (active use qualifications) associated with some ranches, there could be an effect occurring to alter the market value of these ranches. This could, in turn, alter the level of future assessed valuations. Since property tax revenues are generated based on assessed valuation and revenue, it is important to identify the following assessed valuation information for Mesa County as a base for comparison.

The 1977 assessed valuation for Mesa County was $207,422,150 which, when applied to the total average county mill levy of 71.76, produced a total revenue of $14,885,434 (Colorado Division of Property Taxation, Dept. of Local Affairs).

Social Well-Being

There are several ways in which the social well-being of the 472 ES area residents dependent on BLM grazing could be affected. Alterations in the personal income of the families involved would impact their material well-being, altering their relative standing with respect to economic opportunities in the ES area society.

In addition, responses from participants at BLM planning meetings and information contained in the Mainstem Socio Economic Profile, which includes the ES area, indicate a strong attachment to, and high level of acceptance for, traditional land uses. Livestock ranching falls into this category of uses. Any dislocation of individuals within the society from long-standing, accepted associations with livestock ranching could affect individuals within this group by altering their standing within the community or affecting the social surroundings of individuals with respect to a stable environment.

Social and Cultural Attitudes

The following material has been obtained from BLM public participation analysis contained in BLM planning and information documents. Also used as a source was the Socio-Economic Profile of the Upper Colorado Mainstem Region, which encompasses the ES area.

The people living in the ES area can basically be classified as "rural western". Many area residents, especially those associated with livestock ranching with BLM forage dependency, trace their heritage to early mining and settlement efforts. They thus retain a strong attachment to land and its traditional uses and the associated attitudes of independence and hard work.

Participation at public meetings by members of the ranching community in the ES area indicates strong support for the multiple-use management philosophy and support for developments that would facilitate economic growth and orderly development of the region.

Members of rural communities in the ES area have a strong feeling of community identity and view reasonable growth positively, since it provides the opportunity to repair and expand social infrastructure investments.

Livestock ranching is a long-established, accepted way of life in the region, with participants from the ranching community at BLM planning meetings expressing a strong conviction that continued livestock grazing on public lands is both desirable and necessary to supply food to regional and national markets. They also view livestock grazing as an essential element in maintaining a healthy economic base in the ES area. Most livestock ranchers express support for installing range improvements (fencing, water developments, etc.) which would facilitate domestic livestock use.

In addition to the material presented above, the following discussion is included to indicate certain attitudinal elements which could explain why ES area operators strive to remain in livestock ranching even though their capital investment and labor could earn greater monetary returns elsewhere.

A study done on cattle ranching in Arizona ("Socioeconomic Behavior of Cattle Ranchers, with Implications for Rural Community Development in the West", Smith and Martin, American Journal of Agricultural Economics, 1972), indicates the strong non-commercial motives of ranchers. This study is thought to be representative of attitudinal and motivational aspects of livestock ranching in Colorado and the ES area. It points out the aspects of ranching as a consumption good which means that ranches are not considered just as production units, but also as a means of preserving a particular lifestyle. Ranch owners are strongly influenced by the attitude of satisfactory levels of income and wealth consistent with being able to maintain a ranch related lifestyle. The three main attitudes which determine why ranchers stay on their ranches are land fundamentalism, conspicuous consumption/speculative, and rural fundamentalism.

Land fundamentalism was determined to be most important of the three with ranchers influenced by this attitude feeling that:

1. Land ownership permits them to feel closer to the earth.
2. Land ownership causes them to hold more fundamental personal values.
3. Ranch ownership allows them the opportunity of getting back to fundamental personal values.
4. Ranch ownership provides them the opportunity of owning land for its own sake.
5. Ranch ownership provides them a good place to raise children.
6. Ranch ownership allows them to live away from cities at a place of their own.

Those influenced by conspicuous consumption/speculative attitudes would:

1. feel that ranch ownership provides them the opportunity to speculate on ranchland;
2. feel that they are actively speculating on the value of their ranchland;
3. feel they are members of one or more exclusive social organizations;
4. believe that holding ranchland for land appreciation purposes is worthwhile;
5. not receive all of his income from ranching;
6. feel that ranching ownership provides them the opportunity to own land for its own sake;
7. feel that ranch ownership allows them to live away from cities at places of their own.

Ranch owners influenced by the attitude of rural fundamentalism would:

1. live on their ranchers most of the year;
2. feel that ranch ownerships provides them a good place to raise children;
3. have mostly other livestockmen as friends;
4. prefer ranching as a way of life for them in contrast to other occupations;
5. feel that ranching as a way of life is highly important to them;
6. feel that ranch ownership allows them to live away from cities at a place of their own;
7. receive 100 percent of their income from ranching;
8. feel that ranching ownership allows them the opportunity of getting back to fundamental personal values;
9. feel that ranch ownership provides them the opportunity of owning land for its own sake;
10. have always lived on a ranch.

The above attitudinal information explains the motivational aspects of those involved in what would seem to outside observers as a very difficult, risky occupation with relatively low monetary rewards.

Visual Resources

Introduction

The ES area is located in west-central Colorado within the Colorado Plateau physiographic region. The public lands within the ES area lie between the pastoral lowlands or river bottoms and the higher coniferous forests. An exception is the area north of the Grand Valley, where public lands include the high forested ridges.

Public lands in the ES area are characteristically diverse. They include narrow river bottoms, alluvial fans, eroded foothills, flat-topped mesas, and rolling ridges. Vegetation includes aspen, fir, ponderosa pine, pinyon pine, juniper, mountain shrubs, mixed brush, and grasses. The vegetation is closely related to elevation and exposure (see Vegetation section).

Landscape Character

All landscapes have an identifiable character, regardless of size, location, or land use. This character is determined by the relationships between four basic elements: color, line, form, and texture.

The dominant colors in the ES area, which vary with the weather and the time of day and year, are the browns, reds, and greys of soils and rocks and the greens, yellows, reds, and browns of vegetation. Occasional blues, greens, and browns are added by the presence of water.

Lines are distinct in the layering of soils, changes in vegetation types, along ridge tops, and in drainage patterns. Form or topography varies from sheer-walled canyons to flat-topped mesas. Texture results from the different vegetative types and erosion patterns.

The relationships of these four basic elements in the four landscape features -- soil, water, vegetation, and structures -- give the ES area a general landscape character of natural ruggedness, remoteness, and openness.

Cultural Modifications

Cultural modifications are any changes to the natural landscape resulting from the activities of man. They may have a positive or negative visual impact.

Those cultural modifications which have the greatest visual impact are those associated with early mining activities, development of ranches and farms, and recent energy exploration and development and their related service facilities.

Fences are probably the most common intrusion. Fences that were built by brushing out the fence line with a bulldozer are the most obvious. Similar scars from pipeline construction are also visible, even though they have been revegetated; the resulting vegetation pattern creates an unnatural line in the landscape.

Sharp lines have also been created by vegetation manipulation projects such as chaining, spraying, or plowing followed by seeding. The patterns of the pinyon-juniper chainings in the Gateway, Dominguez, and Kannah Creek areas are unmistakably manmade in an otherwise natural landscape. The color and contrast of the debris on the ground detracts from the visual quality. The brush beatings in the Collbran area are less noticeable from the ground than the chained areas.

The total magnitude of visual intrusions on public lands at present is low in comparison with the total area encompassed and the private lands within the ES area. This is due primarily to the ruggedness and remoteness of the public lands, management restrictions, population distributions, and the vast acreage involved. The major intruded areas, which are mostly private (with the exception of the area east of the Dolores River, which is intruded primarily by mining activity), include the Grand Valley, Plateau Valley, Glade Park, Roan Creek Valley, and the area east of the Gunnison River.

Visual Resource Management Classes

Visual Resource Management (VRM) classes have been established for the public lands. The manner in which they are determined is explained in appendix 5. Each VRM class describes a different degree of acceptable modification allowed in the basic elements (form, line, color, and texture) of the landscape. The classes are therefore the basis for determining whether or not a modification would result in a visual impact and, if so, what appropriate mitigating measures would be required. These classes are defined in appendix 5 and the areas they cover are shown in a generalized manner on map 2-17.

Recreation

Situated in the center of the western slope's recreation lands, the ES area provides diverse recreational opportunities. Most of these on public land are for dispersed activity, except for five developed recreation sites, where concentrated use occurs. The recreational resources on public land complement the major regional recreation attractions in the area, such as the Colorado National Monument, Grand Mesa National Forest, Vega State Recreation Area, Island Acres State Recreation Area, and Highline Reservoir (see map 2-18). These regional attractions support intensified visitor use.

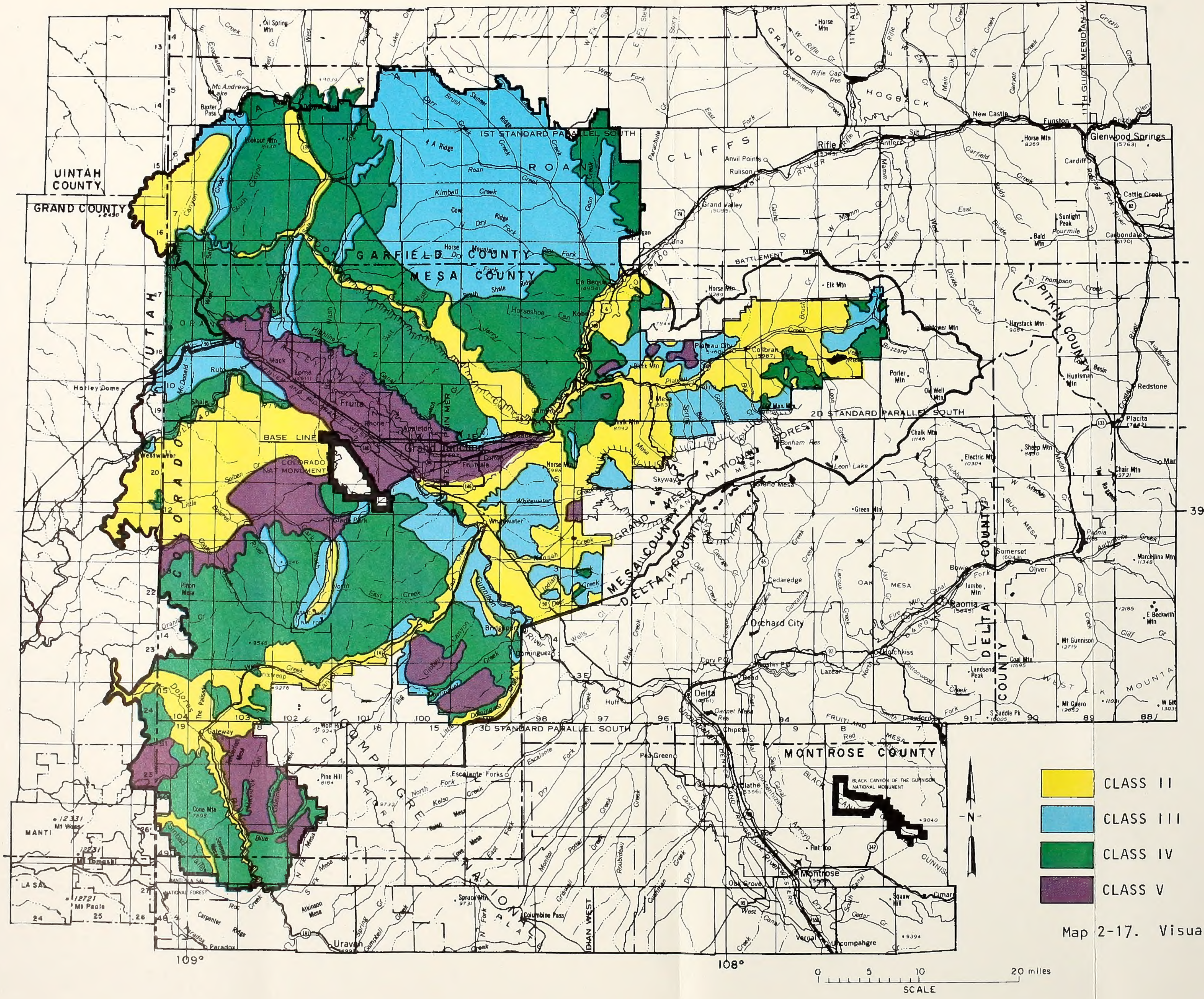
While open space and scenic quality, along with abundant wildlife, are the major recreation attractions, lack of water and restricted access are two major limiting factors. Hunting and sightseeing are probably the two dominant uses.

The heavy visitor use season is about eight months long (April to November), with peak use occurring during the summer tourist months (June to August) and during the fall hunting season (September to November). However, winter use is becoming more prevalent due to the increasing popularity of winter sports such as cross-country skiing, ice fishing, and snowmobiling. Data on actual recreational use of the area is very limited. The many recreational opportunities existing on public land in the ES area are discussed below.

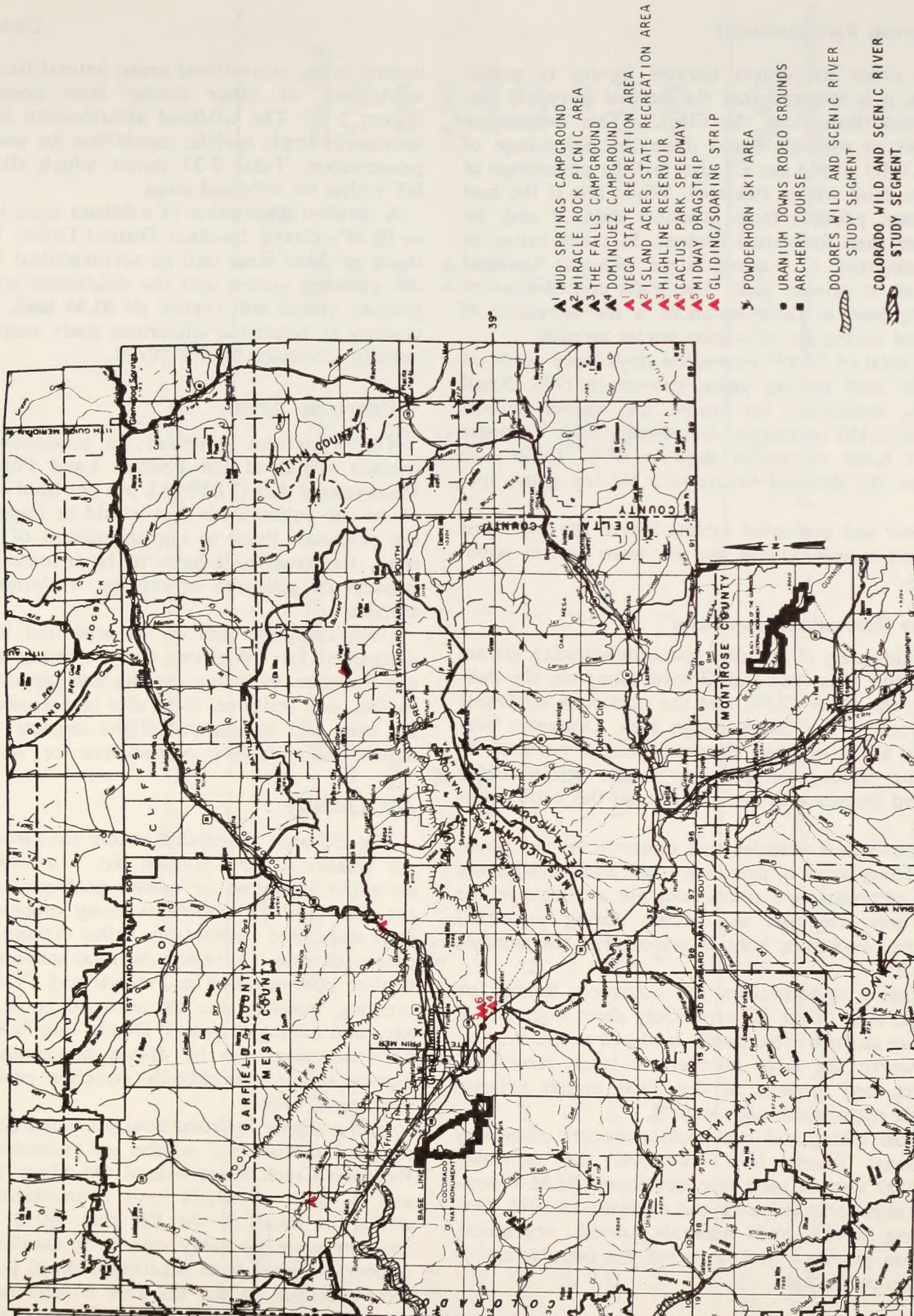
Hunting

A large portion of the dispersed recreational use on public land can be attributed to wildlife values. Huntable populations of big game, upland gamebirds, small game, and waterfowl exist throughout the area.

Visitor-use estimates for hunting represent the only current, statistically reliable data available for any recreational activity in the ES area. Estimates were derived from the Colorado Division of Wildlife Game Management Unit (GMU) records.



Map 2-17. Visual Resource Management Classes



Map 2-18. Recreation Resources

In order to project harvest figures to public lands, it is assumed that the harvest is evenly distributed throughout the GMUs. This assumption allows an estimate based upon the percentage of the GMU within the ES area and the percentage of public land within this area. While this is the best estimate possible from available data, it may be higher than the actual harvest. In many instances the majority of hunting is on adjacent National Forest or private land. The main contribution of public land in these instances is the provision of habitat during the off-season winter months.

A total of 26,977 recreation days were spent on public land by big game hunters in 1976. Small game, waterfowl, fur bearer, and varmit hunters spent 52,450 recreation days during 1975. Trappers spent 6,404 recreation days in 1975. Table 2-22 shows the detailed breakdown for big game species.

Deer and cottontail rabbits where the two most hunted species. Ducks and elk were next in popularity.

Other Recreational Activities

Sightseeing is popular, given outstanding attractions like Unaweep and Dolores Canyons, the Palisade, the Book Cliffs, and the numerous sandstone canyons in the Black Ridge area. Domestic livestock are interesting to some people, particularly during trailing or roundup times, while others regard livestock as an intrusion on the natural setting.

Four-wheel vehicles and motorcycles are popular. Many miles of primitive roads and trails having few administrative restrictions are available in the ES area. Heaviest use occurs during organized events, weekends, hunting season, and the summer months.

Fishing opportunities are extremely limited on public land in the ES area. Only short segments of fishing streams cross public land and access is poor. However, the large numbers of lakes, reservoirs, rivers, and streams in the local region provide ample opportunities for anglers.

Most hiking and backpacking occurs on nearby National Forest land. However, an estimated 300,000 visitors used five developed BLM recreation sites for picnicking and camping in 1975. Collecting rocks and minerals, dried vegetation, pinyon pinenuts, and firewood are popular activities on public land.

Wildland Areas

Several wildland areas have been identified within the ES area through BLM's planning system (see map 2-19). These areas are land units having the potential for designation as various types of natural areas, recreational areas, natural landmarks, wilderness, or other similar land designations (figure 2-15). The wildland identification does not necessarily imply specific capabilities for wilderness preservation. Table 2-23 shows which allotments fall within the wildland areas.

A detailed description of wildland areas is found in BLM's Grand Junction District Office. Further study of these areas will be accomplished through the planning system and the wilderness inventory process, which will review all BLM land. The inventory to determine wilderness study areas is tentatively scheduled for FY 79/80.

Wilderness Areas

The wilderness inventory, in accordance with Section 603(a) of the Federal Land Policy and Management Act (FLPMA), has not been completed on the public lands that would be impacted by the proposal. Prior to implementation of any actions, the areas will have to be inventoried and impacts on potential or existing wilderness areas assessed.

Until Congress acts on an area that has been designated for wilderness study, existing multiple-use activities, including grazing and supporting activities, will continue. New uses or expanded existing uses will be allowed if the impacts will not impair the suitability of the area for wilderness.

Air Quality

The ES area is included within the Grand Mesa Air Quality Control Region No. 7, a region with no major identified air quality problems. At present, the only air pollutants being monitored are total suspended particulates, sulfur dioxide, and nitrogen dioxide. Currently the total suspended particulate concentration in Palisade and Fruita is increasing, possibly due to increased earth disturbance and mining activities. Due to insufficient data, no conclusions can be drawn concerning sulfur dioxide or nitrogen dioxide pollution problems in the Grand Valley.

Non-methane hydrocarbons exceeded air quality standard limits on a number of occasions in the Piceance Creek Basin federal Oil Shale Tracts -a and -b, both of which have characteristics very similar to those of the ES area. Most of these excesses were probably due to a natural cause--terpenes emitted from sagebrush. As 10 percent of the vegetation in the ES area is sagebrush, it is reasonable to assume the NAAQ Standards for non-methane hydrocarbons would occasionally be exceeded.

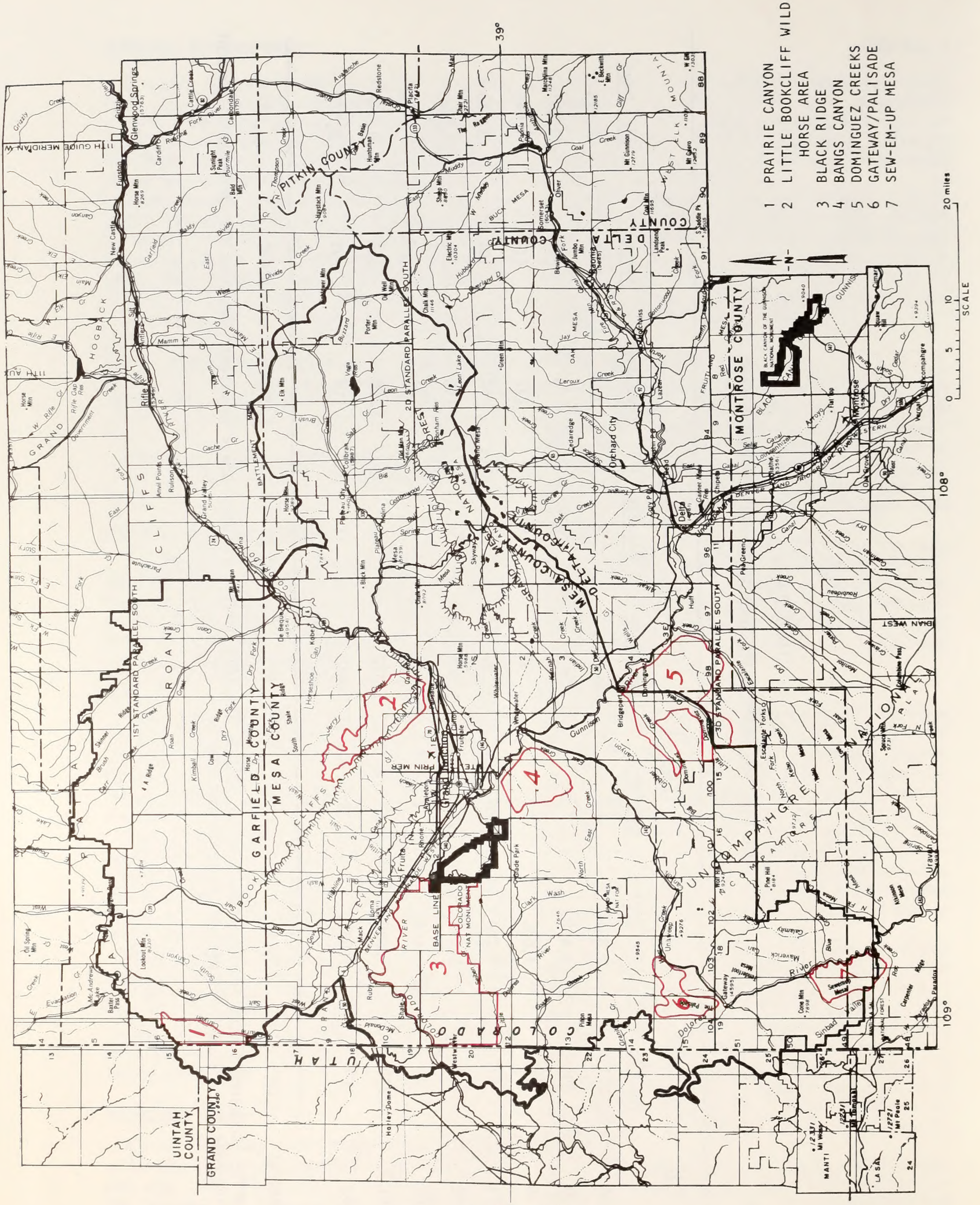
NAAQ Standards for particulates were occasionally exceeded in Tracts -a and -b. Particulate concentrations on the oil shale tracts correlated best

TABLE 2-22

1976 BIG GAME HARVEST AND RECREATION DAYS ON PUBLIC LAND

UNIT	DEER		ELK		BEAR		TOTAL	
	Harvest	Rec. Days	Harvest	Rec. Days	Harvest	Rec. Days	Harvest	Rec. Days
30	271	2,841	---	-----	5	137	276	2,978
31	394	3,428	7	354	4	79	405	3,861
40	374	4,638	27	95	9	212	410	4,945
41	81	1,164	26	1,252	1	54	108	2,470
42	156	1,549	117	3,365	2	193	275	5,107
60	18	454	---	64	1	44	19	562
61	229	2,590	53	1,332	2	260	284	4,182
62	159	1,083	33	875	1	114	193	2,872
TOTALS	1,682	18,547	263	7,337	25	1,093	1,970	26,977

NOTE: Compared to the four-year average for 1972-5, the 1976 harvest figures show a 31 percent decrease for deer, an 11 percent increase for elk, and a 1 percent increase for bear.



Map 2-19. Wildland Areas

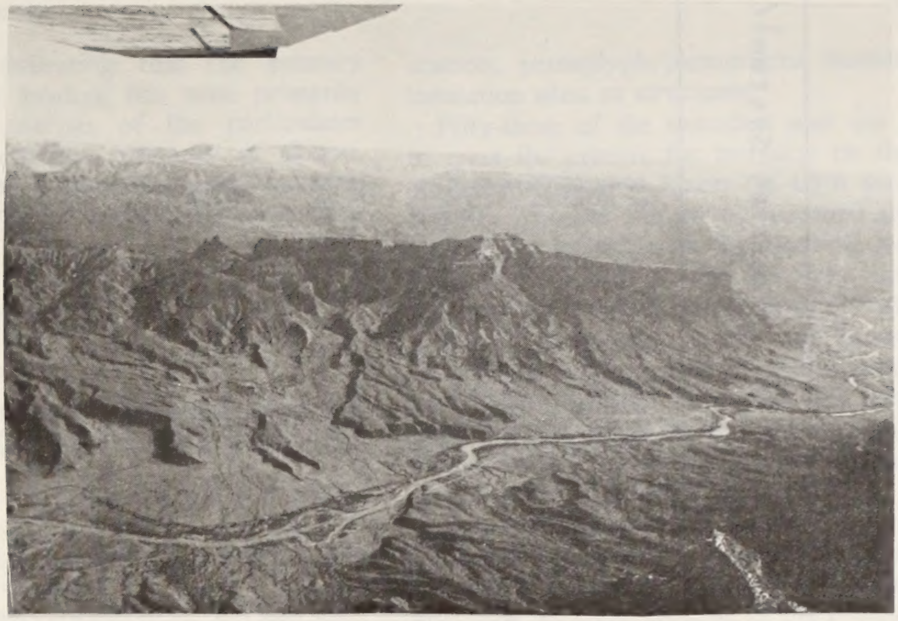
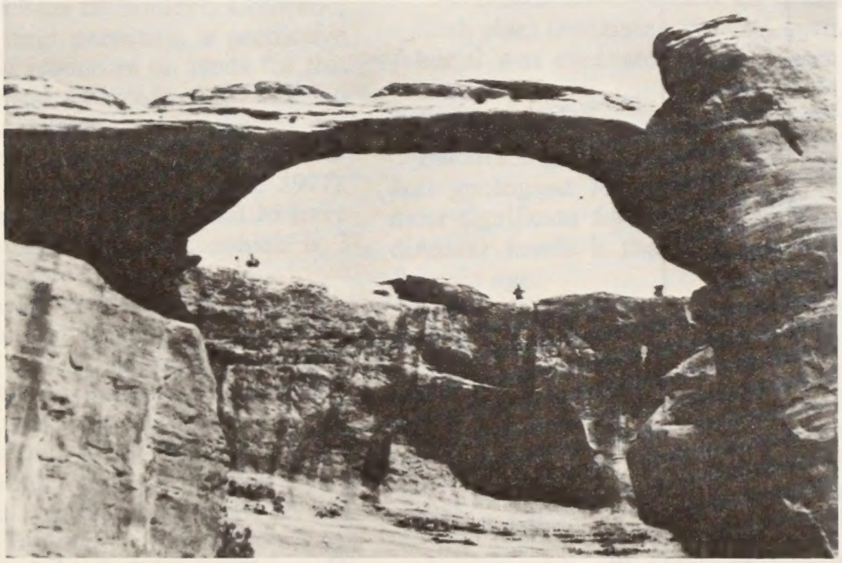


Figure 2-15. Dolores Wild and Scenic River Study segment and Gateway-Palisade Wildland Area. The town of Gateway is by the river below the south (right-hand) end of the Palisade.



Black Ridge Wildland Area. This is one of several arches known to exist in Rattlesnake Canyon.

TABLE 2-23

ALLOTMENTS IN WILDLAND AREAS

Wildland Area	Allotment Name & No.		Grazing System1/
Black Ridge	Upper Bench	116g	RR
	Lower Bench	125a	DR
	Colorado Ridge	130a	DR
	Black Ridge	130b	DR
	Little Dolores Bench	135a	DR
	Knowles	135b	DR
	Three Canyons	141	RR
	Lost Canyon-Sugar Bench	154	DR
Bangs Canyon	Bangs Canyon	116	RR
	Round Knob	152	DR
Gateway-Palisade	Pine Ridge	151	LI
	Palisade Flats	401	RR
	Bulldraw Common	402	DR
	Wright Draw	405	DR
	North Creek	416	DR
Prairie Canyon	Prairie Canyon	616	DR
Dominguez	Wagon Park Common	302	RR
Sewemup	Blue Mesa	406	DR
	Sewemup(No Grazing Area)	---	--

1/ RR = rest rotation; DR = deferred rotation; LI = less intensive management.

with wind speed, indicating that the primary source of particulate loading has been primarily dust. Additionally, analysis of the particulates showed that they consisted primarily of silicon, aluminum, magnesium, copper, iron, and calcium, all of which are found in natural ground surface material.

Cultural Resources

Archeological Resources

Information pertaining to archeological resources located in the ES area was identified in the following manner:

1. A comprehensive literature search was undertaken (see References).
2. A review of the Grand Junction District Site and Survey files was made.
3. A review of the Colorado State Archaeological Site files was conducted.
4. Consultation with individuals knowledgeable of archeological resources in the ES area was carried out.
5. A stratified random sampling survey for cultural resources is being performed by Archaeological Associates of Boulder, Colorado. This survey was begun in September 1977 and will be completed by June 1979.

CULTURAL RESOURCE DATA

One hundred forty-three cultural resource surveys have been performed in the ES area.

Archaeological Associates of Boulder, Colorado, is currently surveying and preparing a predictive model for archeological resources on lands for this ES and the West- Central Colorado Coal ES. To date, Archaeological Associates has surveyed approximately 14,000 acres and recorded 51 archeological sites (personal communication, Huse 1977). A total of 30,000 acres administered by BLM have been examined for cultural resources, which is 3 percent of the public lands.

Preliminary site density data from Archaeological Associates, suggests that approximately 2.17 archeological sites will occur per section (Hibbets 1978, p.5). Although the Archaeological Associates survey is incomplete, there appears to be a strong correlation between topography and site density (ibid., p. 5) and topography and site location (ibid., p. 27). Site density and location data based on soil and vegetation zones are two of the expected results from the Archaeological Associates survey.

The overall cultural resource search (the Archaeological Associates survey plus surveys conducted by the District archeologist) has resulted in 451 archeological sites being recorded within the ES area. The sites are identified on map 2-20. These sites are broadly identified as follows: lithic scatters, petroglyph/pictographs, burials, wikiups, habitation sites, or structures.

Fifty-three of the recorded sites are considered to meet the criteria for inclusion on the National Register of Historic Places (36 CFR 800.1 through 800.10). Another 346 of the recorded sites may be eligible for inclusion on the National Register. No archeological sites in the ES area are currently recorded on the National Register (1976).

Eleven archeological sites are known to have been tested or excavated by professional archeologists. Two hundred nine sites are considered to have been disturbed by amateur archeologists/vandals or erosion. Thirty-nine sites are considered to have been totally destroyed.

Four archeological sites in the ES are of particular significance. One, the Taylor Site, helped define the Uncompahgre Complex, and three aided in establishing an understanding of the Fremont occupation of West Central Colorado. The four sites are:

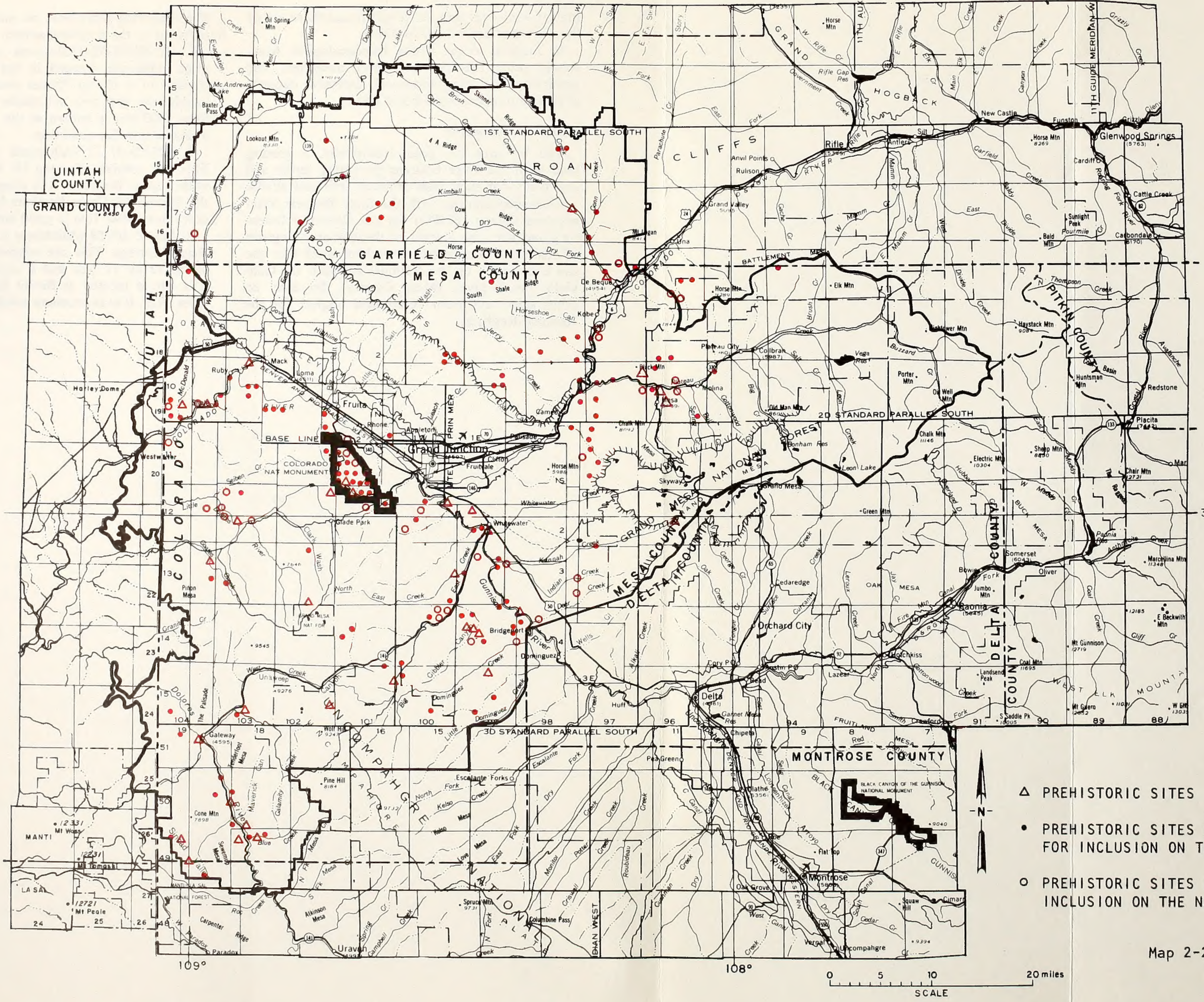
1. Taylor Site—a rockshelter in East Creek excavated by H.M. Wormington which helped define the Uncompahgre Complex (Wormington 1955, p. 122).
2. Arroyo Sites—three Fremont habitation sites on Glade Park excavated by H. Dick. A probable molded clay figurine and corn cobs were found (ibid., p. 129).
3. Roth Cave—a cave on Glade Park containing a burial and corn was excavated by R. Lister (ibid., p. 130).
4. Luster Cave—a cave on Glade Park (on the Utah side) containing pottery, corn, and an infant burial was excavated by R. Lister (ibid, p. 130).

Paleontological Resources

Paleontological resources are obtained from several geological formations in the ES Area. The most significant formation producing mammal and dinosaur fossils is the Morrison Formation of the Jurassic age.

Cultural resource inventories performed under contract until 1977 have included an inventory of paleontological resources. The major inventories pertaining to paleontology are the Colorado River Antiquities Survey (Historical Museum and Institute of Western Colorado, 1976) and The Antiquities Inventory of the Whitewater Planning Area in the Grand Junction Resource Area (ibid.).

An intensive paleontological evaluation of the Fruita Paleontological Area was made by a distinguished panel of paleontologists, including Dr. George Gaylord Simpson, Dr. Nicholas Hotton, Dr. G. Edward Lewis, Dr. George Callison, Dr. Peter Robinson, Mr. Russ King, and Mr. Lance Eriksen. Their assessment of the Fruita Paleonto-



△ PREHISTORIC SITES

● PREHISTORIC SITES POTENTIALLY ELIGIBLE FOR INCLUSION ON THE NATIONAL REGISTER

○ PREHISTORIC SITES ELIGIBLE FOR INCLUSION ON THE NATIONAL REGISTER

Map 2-20. Archeological Sites

logical Area was that the fossils found there are of "world significance" (BLM 1976).

In addition to the Fruita Paleontological Area, sixteen other localities have been identified. The possibility of finding additional, extensive deposits of paleontological resources is good.

Historical Resources

The ES area has been, historically, a grazing land with the river bottoms providing fertile soil and water for such cash crops as fruit and alfalfa.

Upon consultation with the State Historic Preservation Officer (SHPO) via the Colorado Inventory and with the Keeper of the National Register of Historic Places, it has been determined that one site is currently on the National Register: the Convict's Bread Oven (Mesa County). To date, no other sites have been determined eligible for the National Register.

The following three sites on public lands could be affected by the proposed action:

1. HS-05-07-12 (Allotment no. 409) Copper Mine. This site, located in the Sinbad Valley, consists of a 10- by 20-foot cookhouse, a stone bunkhouse, and two mineshafts. The site dates from 1900 and is known as the Eldridge Mines. This site is in fair condition.
2. HS-05-07-17 (Allotment no. 409) Cabin. This site consists of a log 10- by 12-foot cabin with a stone fireplace. It is alleged to have been the famous McCarty Brothers hideout. The site dates from 1890. It is in good condition.
3. HS-05-07-58 (Allotment no. 602) Cabin at Barrel Springs. This site consists of a log cabin about 12 by 12 feet and a corral with a shed. The site is located at Barrel Springs and dates from 1920. It is in excellent condition.

CHAPTER 3

CHAPTER 3

THE ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

Introduction

The impacts which would arise from implementation of the proposed actions are described in this chapter. The analyses consider the predicted impacts of the grazing management and range improvements described in chapter 1 on the component elements reported in chapter 2. The proposed action is broken down as follows:

- A. Grazing Management
  - 1. Grazing systems, less intensive management and eliminated grazing
    - a. High density - low frequency (high density results from concentrating livestock into a restricted portion of an allotment; low frequency refers to the extended rest period relative to the grazing period.)
    - b. Timing (of grazing and resting)
    - c. Trampling
    - d. Rubbing
    - e. Presence (of livestock)
- B. Range improvements
  - 1. Vegetation manipulation
    - a. Chaining and seeding
    - b. Brush beating
    - c. Thinning
    - d. Burning
  - 2. Range facilities
    - a. Reservoirs
    - b. Water catchments
    - c. Spring developments
    - d. Wells
    - e. Pipelines
    - f. Fences
    - g. Cattleguards
    - h. Roads and trails.

Each section has a summary of the overall, unitwide impacts resulting from the proposal. If a proposed action does not impact, or has only negligible impact on, a particular environmental component, it is generally omitted in that section. For example, cattleguards are not mentioned in the air quality section.

In some instances significant impacts would occur only during the construction phase of a project. These are discussed in detail where applicable.

A short-term impact is defined as an impact which would affect the environmental component up to eleven years after initiating the proposed action. This eleven-year period is the time required for implementation of the proposal and completion of one grazing cycle. A long-term impact is an impact which would continue to affect the environmental component more than eleven years after initiation of the proposal.

The 88 less intensively managed allotments and 2 elimination of grazing areas would not be impacted by vegetation manipulation and range facility projects since none of these are proposed for these areas. Therefore, impact analysis of these 90 allotments is given under grazing systems.

The proposed action is predicted to have no significant impacts on topography, geology and minerals, climate, or wild horses.

Assumptions and Analysis Guidelines

1. The proposed action would be implemented over an eight-year period following completion of the final ES.
2. BLM would have the funds and manpower available to implement the proposal.
3. Standard operating procedures in chapter 1 would be enforced.
4. Disturbance totals would be as given in table 3-1.
5. Existing improvements in the ES area would be maintained in serviceable condition.
6. Colorado DOW would properly manage wildlife populations to not exceed the habitat carrying capacity.
7. Forage increases would be available for use by the year 2000. Actual allocations would be made through future MFPs. (Planning estimates of these allocations are made in the livestock grazing section.)
8. The base data for vegetation condition, trend, and production is the most reliable data presently available. Available data was used whenever it was applicable and extrapolated to areas for which no data was available.
9. Active livestock qualifications were used instead of licensed use (including scheduled nonuse)

TABLE 3-1

PROJECT DISTURBANCE TOTALS

PROJECT	PROJECT TOTAL	ACREAGE FACTOR	TOTAL ACRES DISTURBED[1/] SHORT-TERM	LONG-TERM[2/]
Chaining & Seeding	3,925 ac.	--	3,925	0
Brush Beating	3,430 ac.	--	3,430	0
Thinning	2,480 ac.	--	2,480	0
Burning	1,000 ac.	--	1,000	0
Reservoirs	58 ac.	1.00 ac./ea.	58	46.4
Water Catchments	7 ea.	2.00 ac./ea.	14	11.2
Spring Developments	34 ea.	0.50 ac./ea.	17	6.0
Wells	4 ea.	0.25 ac./ea.	1	0.3
Pipelines	137.7 mi.	1.21 ac./mi.	166.6	16.7
Fences	128.1 mi.	1.21 ac./mi.	155.0	0
Cattleguards	27 ea.	0.10 ac./ea.	2.7	0[3/]
Roads & Trails	8.1 mi.	2.42 ac./mi.	19.6	12.7
TOTALS			11,265.8	93.3

[1/] Disturbance is defined as the interruption of the land's production of vegetation.

[2/] Revegetation percentages, based on BLM estimates, are as follows: reservoirs, 20%; water catchments, 20%; spring developments, 65%; wells, 70%; pipelines, 90%; roads & trails, 35%; all others, 100%.

[3/] No acreage indicated; project is located on roads.

in all tabular displays. A difference of 8 percent exists between the two figures and, given the level of impact analysis, it was determined that this small difference was not significant in impact identification.

Vegetation

Introduction

The base data used for the analysis of impacts on vegetation was derived from a 1963 Range Survey, the Phase I Watershed Survey, and ocular reconnaissance survey transects conducted by BLM range conservationists who designed the AMPs. Since the 1963 Range Survey information is over ten years old and did not cover all areas within the ES area, the Phase I Watershed Survey and ocular reconnaissance survey transects gathered from 1973 to 1977 were used to support the 1963 Range Survey data. Data on present plant production and range condition for the 88 allotments proposed for less intensive management and the 2 elimination of grazing areas are based upon ocular observations conducted by BLM range conservationists in 1976 and 1977. The base data on vegetation is the most reliable data presently available.

Estimations of vegetation impacts are based on professional judgment and cited studies which, although not conducted within the ES area, are believed applicable to the area since the findings discuss the results of meeting basic plant needs. Meeting plant needs for reproduction and establishment generally results in similar responses regardless of location (Martin 1975).

The monitoring studies described in chapter 1 and elaborated on in chapter 4 are designed to reveal any deviation from estimated vegetation impacts of the proposed action. If the desired results were not being achieved, then the allotment management plans (AMPs) would be revised as necessary to accomplish desired objectives.

Impact on Vegetation Types

The proposed vegetation manipulation projects would alter the present vegetation type on 10,835 acres (less than 1 percent of the total ES area). Chaining and seeding would convert 3,925 acres of pinyon-juniper type to a grass vegetation type. This change would result in an estimated permanent loss of 39,250 cords of wood, since the project areas would be maintained in a grass vegetative type and pinyon-juniper would not be allowed to regrow in the treated areas.

Brush beating would result in the conversion of 3,430 acres of mountain shrub type to a grass vegetation type. This conversion would result in improved growth and reproduction of native grasses.

Thinning of 2,480 acres of pinyon-juniper type would not result in a vegetation type conversion. However, the removal of the overstory would open the stand and provide space and sunlight for the understory, resulting in improved plant growth and reproduction of the herbaceous understory plants (Stoddard, Smith, and Box 1975). It would also result in the loss of 24,800 cords of wood production.

Burning would remove the present mountain shrub vegetation from 1,000 acres. However, the shrubs would resprout after burning. The project would be maintained by livestock grazing and reburning, if necessary. Burning would increase accessibility for, and use by, livestock and wildlife as well as provide more space, moisture, and nutrients to the native and seeded grass species.

A total of 3,925 acres (less than 1 percent) of pinyon-juniper type would be converted to a grass type. The mountain shrub type would be reduced by 4,430 acres (less than 3 percent of the mountain shrub type). A total of 64,050 cords of wood would be lost due to the chaining (3,925 acres) and thinning (2,480 acres) of the pinyon-juniper type. The overall impact on vegetation types would be negligible.

Impacts on Range Condition and Trend

Table 3-2 identifies the present range condition of all the public land in the ES area by proposed action components. Approximately 18 percent (216,885 acres) of the public land is in good condition, 47 percent (566,403 acres) in fair condition, and 35 percent (417,569 acres) in poor condition. Appendix 3 gives details on the methodology used to analyze the present range condition. Appendix 9 portrays this information according to the vegetation types in each allotment proposed for intensive management AMPs.

The observation of range condition over time is expressed as range trend, which can be upward, static, or downward. Determining range trend is difficult because few objective means of assessing trend are available. Little past trend information is on record for the ES area. However, analysis of trend data gathered during the development of the AMPs (1976-1977) indicates that the apparent trend could be downward on about 42 percent (500,389 acres) of the public lands, static on 50 percent (605,371 acres), and upward on 8 percent (95,097 acres). In addition, information on eleven existing AMPs and the Naval Oil Shale Reserve is on file in the Grand Junction District Office.

The record of the existing AMPs within the ES area is new, subjective, and somewhat variable. Analysis of available photographs and range condition and trend data on the three fully implemented rest rotation AMPs indicates that range condition

TABLE 3-2

PRESENT & PREDICTED RANGE CONDITION

	Present Condition Acres (Percent P.L.)			Predicted Condition1/ Acres (Percent P.L.)		
Management	Good	Fair	Poor	Good	Fair	Poor
AMPs (Intensive)	197,857 (16)	490,367 (41)	417,536 (35)	550,463 (46)	388,823 (32)	166,474 (14)
Deferred Rotation	61,519 (5)	256,626 (21)	208,691 (17)	222,105 (18)	207,539 (17)	97,192 (8)
Rest Rotation	136,338 (11)	203,086 (17)	195,611 (16)	306,786 (26)	165,582 (14)	62,667 (5)
Best Pasture		30,655 (3)	13,234 (1)	21,572 (2)	15,702 (1)	6,615 (1)
AMPs (Less Intensive)	19,028 (2)	60,149 (5)	33 (<1)	24,932 (2)	54,245 (5)	33 (<1)
Elimination of Grazing		15,887 (1)			15,887 (1)	
1,200,857 acres Total P.L.	216,885 (18)	566,403 (47)	417,569 (35)	575,395 (48)	458,955 (38)	166,507 (14)

1/ Predictions are for the year 2000.

is fair and trend is up on Fish Park (101) and Davis (201), while Sunnyside Common (801) is in poor condition with a static trend.

Of five partially implemented rest rotation AMPs, Gibbler Common (301) and Wagon Park Common (302) are showing an improvement in their present fair condition, with trend being upward. The three remaining partially implemented allotments, Mt. Garfield Common (509), East Salt (602), and Corcoran Wash (704), have not shown any improvement from their present fair condition and trend remains static. It is felt that full implementation of these AMPs would be necessary before an improvement would occur. One allotment, Big Salt (501), has not had its rest rotation system implemented. It remains in poor to fair condition with static trend.

The two remaining allotments, East Tom's Canyon (106) and Winter Flats (713), are not fully implemented but have been operating with deferred rotation and best pasture grazing systems respectively. Both of these allotments are showing improved range condition and an upward trend.

Immediately to the east of the ES area is the Naval Oil Shale Reserve, the forage resource of which is under BLM management. In 1964, a 61 percent reduction was imposed on the livestock operators not willing to operate under a management system. Two allotments were placed, and have remained, under rest rotation grazing plans for 12 years. One allotment continues under season-long grazing; this allotment received reductions of 43 and 61 percent respectively on cattle and sheep numbers. These operators on the two allotments under rest rotation initially took some voluntary nonuse (less than 20 percent).

BLM comparison studies were conducted on heavily used drainage bottoms within the three allotments in 1973. The average percentages of the ground cover on the rest rotation and season-long allotments were, respectively, as follows: vegetal cover, 34 and 13; litter, 31 and 23; and bare ground, 35 and 64 (see appendix 3).

From the foregoing record, it appears that the principles of rest rotation and deferment apply to the ES area. Such systems have a high probability of success when the progress is monitored and corrective adjustments are made.

Range condition classification is based upon the theory that vegetation is the product of environment. Vegetation is used as the major indicator of range condition. The environmental conditions of most direct importance to range vegetation can be classified as climatic, edaphic (soil), and biotic (primarily grazing animals). Little control can be placed on climatic or edaphic conditions, but a large measure of control can be exercised over biotic conditions through the management of livestock grazing.

Through implementation of the proposed grazing systems and intensified management of livestock grazing in the ES area, adjustments could be made in the density of stocking and frequency of use, time of grazing, and trampling of seed. These adjustments would influence vegetative composition, production, and basal ground cover, which are factors that determine range condition.

The rate of change in these factors is determined by trend. Indicators of trend are plant vigor, reproduction, seedling establishment, and litter accumulation.

The high density of stocking at less frequent intervals designed into the grazing systems would result in a concentration of livestock grazing on certain pastures within allotments for limited periods of time. According to Martin (1975), heavy stocking for short periods would result in more even utilization of forage within a pasture, both from place to place and among species. Consequently, the favored forage plants would have a better chance than under systems where livestock have an opportunity to be more selective and repeatedly graze the more desirable vegetation.

The lower frequency of grazing during critical plant growth stages (March 15 to June 15) associated with the grazing systems would result in several beneficial impacts. Rapid recovery of forage plants from a period of grazing, with a period of rest during the subsequent growing season, would provide an opportunity for the range vegetation to regain and improve its vigor (Martin 1975). Along with the increased vigor would come an increase in reproduction, seedling establishment, litter accumulation, and plant density as well as improved composition. With individual plant responses there should be an increase in forage production (Hormay 1970). These plant responses would indicate an improvement in the general range condition.

Benefits would also be derived from the change in the timing of grazing. All of the allotments have received the same amount of grazing use during the same season over the last several years (BLM 1977). Much of this use has been during the critical growth period of the desirable range forage plants. Utilization has ranged up to 70 percent of the key forage species during the spring, when root energy stores are low, or during the rapid growth phases of the plants. The continual grazing during these times has resulted in reduced vigor, reproduction, litter accumulation, and seedling establishment. As a result, species composition is poor and production and cover are low on many areas. Utilization will be monitored to insure that it does not exceed 60 percent of the key forage species.

Hormay (1956) stated that "resting must be timed so as to provide the key forage species on the range the opportunity to produce on a continuous basis". Under a well-planned grazing system in which ranges in unsatisfactory condition are not grazed during the critical growth periods of key species, ranges improve without necessitating a reduction in stocking (Johnson 1965 and Laycock 1967). The proposal does call for reductions in stocking on some allotments, which would add to the improvement expected from resting.

The proposed grazing systems would provide rest for the range vegetation during the critical spring growing season. The deferred rotation grazing systems would shift approximately two-thirds of the present spring grazing to fall and winter, while the rest rotation and best pasture systems would provide complete rest to at least one pasture in each allotment every year. The increase in fall and winter grazing would have only a slight impact, since key forage species are dormant for much of this time. This spring rest would allow plant growth and seed and root development (vigor). The overall result should be increased reproduction, seedling establishment, and litter accumulation, which would result in improved range vegetation composition, density, and forage production.

The grazing systems would allow desirable forage plants an additional opportunity to grow and develop seed heads. Increased livestock trampling during the fall and winter could aid in shattering seed heads and trampling seed into the soil (Hormay 1970). From this seedbed, seedling establishment would be more favorable and would result in an increase in seedling establishment, reproduction, and litter accumulation, which would result in improved range vegetation composition, density, and forage production.

The less intensive management allotments, involving 79,210 acres of public lands, are expected to continue with presently apparent range trends since no range improvement projects or grazing systems are proposed.

The review of available information on the less intensive AMPs generally indicates an upward trend in range condition. Where trend is upward, these ranges are expected to go to the next condition class, e.g., from fair to good, by the year 2000 because present management is satisfactory. Range condition would be expected to improve more rapidly on those areas above the 14-inch precipitation zone.

Two areas involving 15,887 acres of public lands would have livestock grazing eliminated. These areas are characterized by high rates of geologic erosion and low production potential for plants. Complete removal of livestock use would allow modest increases in range condition and trend. However, in a study by McLean and Tisdale (1972) in British Columbia in rough fescue and ponderosa pine zones, it took up to 40 years for range in poor condition to recover to good condition when protected from livestock grazing. The recovery from fair to good condition was more rapid (about 20 years). Little change in plant composition took place inside the exclosures in less than 10 years following fencing.

This study took place in an annual precipitation zone of about 25 inches in rough fescue and pine-bunchgrass vegetative types. Most of the ES area, including the allotments proposed for elimination of grazing, is in an annual precipitation zone of 10 to 15 inches. The conifer type, which in the ES area corresponds to the study area's vegetative types, is found in upper elevations of the area, which have an average of 20 inches of precipitation annually. By comparing precipitation patterns, erosion potential, and soil types of the study area and the two elimination of grazing areas, it could be assumed that the time necessary for recovery to good range condition would be well over 40 years.

Table 3-2 identifies the expected changes in range condition on public lands due to the aggregate results of all the foregoing effects. As this table indicates, by the year 2000 an increase of 30 percent (358,510 acres) of the public land would be in good condition, a decrease of 9 percent (107,448 acres) in fair condition, and a decrease of 21 percent (251,062 acres) in poor condition. (Appendix 9 details this information according to the vegetation types in each allotment with proposed intensive management AMPs). The expected average trend of condition for the year 2000 would be approximately 92 percent upward, 8 percent static, and 0 percent downward.

These predicted changes in range condition and trend may be attributed to expected changes in the areawide average, estimated, present vegetative composition (grass from 35 percent to 41 percent, forbs from 8 percent to 7 percent, shrubs from 44 percent to 40 percent, and from trees 13 percent to 12 percent), production (from 11.0 acres per AUM to 9.9 acres per AUM), and basal ground cover (from 33 percent to 41 percent) by the year 2000.

Results of monitoring the AMPs through this period would be expected to show an upward trend in condition, with the areawide establishment of good vegetation vigor, reproduction, seedling establishment, and litter accumulation. The overall impact expected by the year 2000 would be a significant improvement in range condition and trend. The improved range condition and trend is expected to result in impacts on wildlife, soils, and recreation. These impacts are discussed in detail in later sections of this chapter.

Impacts on Forage Production

The value to human beings in improved range condition and trend is in the increased products harvested from the rangelands. One product realized from improved ranges can be quantified as AUMs of livestock forage production, a term which describes consumptive use. It is estimated that approximately 109,705 AUMs of livestock forage is being produced annually. This represents only 34 percent of the 318,376 AUMs of the current vegetative forage production that this area could potentially produce under a climax condition, based on the Soil Conservation Service range site descriptions (see appendix 3 for methodology).

As long as livestock grazing occurs in the ES area, a climax condition will not result. Although a climax condition is not readily achievable, the subclimax level expected to be reached by 2000 would result in good range conditions and a higher level of livestock forage production.

The proposed grazing systems are expected to result in the greatest impact on forage production. Studies conducted in 1973 on two rest rotation allotments in the Naval Oil Shale Reserve, which lies immediately to the east of the ES area, indicated a 10 percent increase in livestock numbers was feasible due to increased forage production. Further stocking increases in the future are possible if vegetation continues to improve as it has in the past under the rest rotation grazing systems.

The initial 13 percent (12,683 AUMs) reduction in stocking levels for the ES area would result in some forage production increases due to decreased use. More importantly, the careful management of livestock grazing would allow the needed increase in plant vigor and in numbers of high forage-producing species to accomplish the increase of the 10,593 AUMs of forage production attributed to the proposed grazing systems. Table 3-3 summarizes the predicted forage production for the areas under AMPs and elimination of grazing.

Vegetation manipulation projects would also contribute to expected increases in forage production. The rate of success in vegetation manipulation projects, where the vegetation on large acreages has been modified for an increase of forage, has been high. There are 62 such projects on file for the ES area. On 46 projects, there are no evaluation records. Records are available for the 16 projects (see table 3-4).

There are five complete or partial failures, which are traceable to deficient methods, e.g., spraying herbicide in sage grouse habitat, chaining without seeding, or grazing with poor consideration for seedling establishment. Dry years following treatment have undoubtedly operated against success. Eleven projects on sagebrush, mountain shrub, and pinyon-juniper sites have shown good establishment of seeded and native perennial herb species. Two of these areas have subsequently been overutilized by livestock but remain in fair to good condition. Figures 3-1 through 3-6 show some of the effects of chaining and seeding, brush beating, and fire reseeding projects completed in the ES area. For a more detailed description of the projects, see appendix 3.

The proposed vegetation manipulation would disturb 10,835 acres and alter present production in the vegetation types that occur in the areas. The removal of overstory vegetation and seeding of desirable species would be expected to result in 1,111 AUMs of increased forage production in five years. Table 3-5 shows the acreage, present and predicted acres per AUM, and present and predicted production for each vegetation manipulation project in each allotment.

Range facilities would result in a temporary loss of vegetation production on 434 acres. However, after the five years required for revegetation, water development projects (reservoirs, water catchments, springs, and wells) would permanently remove 63.9 acres, pipelines and fences 16.7 acres, and trails and cattleguards 12.7 acres. The impact of a total 93.3 acres being removed from vegetation production is insignificant when one considers the overall 1,200,847 acres being analyzed.

The greatest impact from these projects would be on forage production. The projects would provide more uniform utilization of vegetation and distribution of livestock within allotmemts.

Increasing the availability of watering places is the first recommendation made by most range experts to improve grazing distribution (Williams 1954). These facilities would encourage livestock and wildlife to utilize areas which previously received limited use due to inadequate water. This is particularly true in this region of rough mountains and poorly watered ranges (Cook 1967). To achieve uniform use, a range manager must select the proper combination of practices needed on a particular unit. The proposed intensive AMPs and associated range facilities would result in heavily grazed areas receiving less pressure, allowing the vegetation an opportunity to complete growth and increase forage production.

An 11 percent increase (11,704 AUMs) in production due to the proposed action is predicted. The estimated production by the year 2000 is only 38 percent of potential vegetation forage production. This difference may be real or could be due to conservatism in estimating production gains and to the high (40 percent) utilization factor in the total potential annual forage production growth estimate (see appendix 3). In any event, an expected

TABLE 3-3

PRESENT AND PREDICTED AUMs, AND POTENTIAL FORAGE PRODUCTION

Management	Percent of Total Public Land	Present Production1/ (AUMs)	Predicted Production1/ (AUMs)	Potential Production2/ (AUMs)
AMPs (Intensive)				
Deferred Rotation	44	45,730	52,457	128,387
Rest Rotation	45	54,074	58,429	157,805
Best Pasture	4	3,320	3,942	25,453
Subtotal	93	103,124	114,828	311,615
AMPs (Less Intensive)3/	7	6,263	6,263	6,263
Elimination of Grazing	<1	318	318	318
Grand Totals	100	109,705	121,409	318,376

NOTE: Information on each allotment proposed for intensive management is in Appendix 9.

1/ AUMs of utilizable livestock forage under proper use.

2/ AUMs of total current annual plant growth under climax condition at 40 percent utilization (1800 lbs./AUM at 720 lbs. ingested).

3/ Information on AUMs of present, predicted, and potential production is not available at this time. Therefore estimates are based on present licensed use.

TABLE 3-4

RATE OF SUCCESS FOR VEGETATION MANIPULATION PROJECTS

Project Number	Project Name	Allotment Number	Vegetation Type	Methods	Seed Mix & Rate1/	Acres	Success (includes dates of record)	Date of Completion
Projects with Satisfactory Results								
0009	Timber Ridge Seeding	137	sagebrush & pinyon-juniper	Chain & seed	Agcr 8#/ac Meof 1#/ac	1000	400% AUM increase (20 ac/AUM to 5 ac/AUM) within 5 years	12/06/60
0205	Barrel Springs Seeding	602	sagebrush	Plow & seed	Agcr 7#/ac	345	Good establishment overgrazed	11/07/62
0423	Clark Wash Reseeding	131	sagebrush	D-6 cat	Agcr 4,8#/ac	300	Good	09/18/48
0432	Dominguez Seeding	301	sagebrush, pinyon-juniper	Chain once -- seed	Agcr 3#, Agsm 3#) Elju 3#, Meof 1#) /ac	4057	Good, not as good as #0777 05/06/78	05/09/64
0475	Beezer Creek Reseeding	163	sagebrush	Disc plow -- spray	Agcr 3,5#/ac	480	Adjacent lands prove this a success	06/01/73
0578	Kannah Cr. Seeding	201	pinyon-juniper	Chain & seed	5# grass 5# forbs 9# shrubs	500	Fair, heavy utilization 1978	05/65
0665	Steamboat Mtn. Chaining	302	sagebrush, pinyon-juniper	Chain	no seeding	997	Good orhy decadent, Agcr good	06/04/66
0777	Wagon Park Seeding	302	sagebrush, pinyon-juniper	Double chain w/ seeding between chains	Agcr 5#/ac Meof 1#/ac	1439	Agsm & Orhy established & good condition	10/21/66
4082	Tri-Mesa	302	pinyon-juniper	Double chain w/ seeding between chains	Agcr Atca Mesa	1142	Good, little grazed	06/71
4128	N. Cactus Park Seeding	301	sagebrush	Aerial seeding	Agsm 5#/ac Spcr 4#/ac Orhy 1#/ac	325	Good, considering method	12/71
Projects with Unsatisfactory Results								

TABLE 3-4 (Continued)

RATE OF SUCCESS FOR VEGETATION MANIPULATION PROJECTS

Project Number	Project Name	Allotment Number	Vegetation Type	Methods	Seed Mix & Rate1/	Acres	Success (includes dates of record)	Date of Completion
0230	Hay Canyon Seeding	602	sagebrush	Drill	Agcr 7#/ac	75	Poor	11/28/62
0780	Black Ridge Seeding	130	sagebrush, pinyon-juniper	Chain & seed	Agcr	1162	Good 6/77	11/22/66
0781	Bookcliff Seeding	509	sagebrush	Drill	Agcr	75	Seeding failed on some acres	09/03/56
0811	Brewster Ridge Seeding	603	sagebrush	Drill	Elju Meof Agcr	817	Poor seedling "take" or was overgrazed	08/05/57
1045	Cow Mtn.	703	sagebrush	Spray		1187	Failure, reduction in wildlife	06/30/68
3523	Coal Gulch Chaining	502	sagebrush, pinyon-juniper	Chain		542	Poor, quick return of shrubs	07/09/68

1/ Agcr = Crested wheatgrass, Agsm = Western wheatgrass, Atca = Fourwing saltbush, Elju = Russian wildrye, Meof = Yellow sweetclover, Mesa = Alfalfa (Lucerne), Orhy = Indian ricegrass, and Spcr = Sand dropseed.

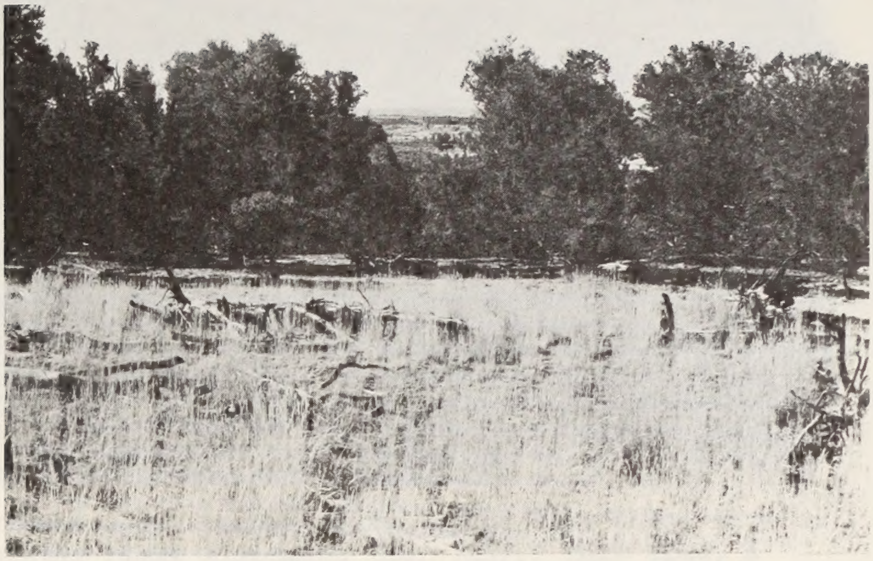


Figure 3-1. Results of chaining and seeding on Timber Ridge Allotment (no. 137). Note grass plants and ground cover.

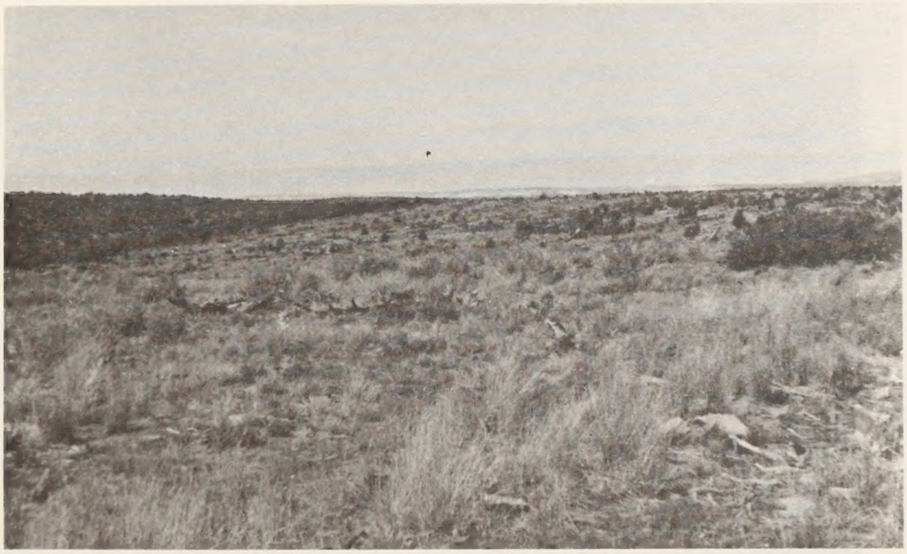


Figure 3-2. Forage production within the Timber Ridge chaining and seeding project. Note the extensive bare ground below the pinyon-juniper canopy compared to the forage production in the chained and seeded foreground.

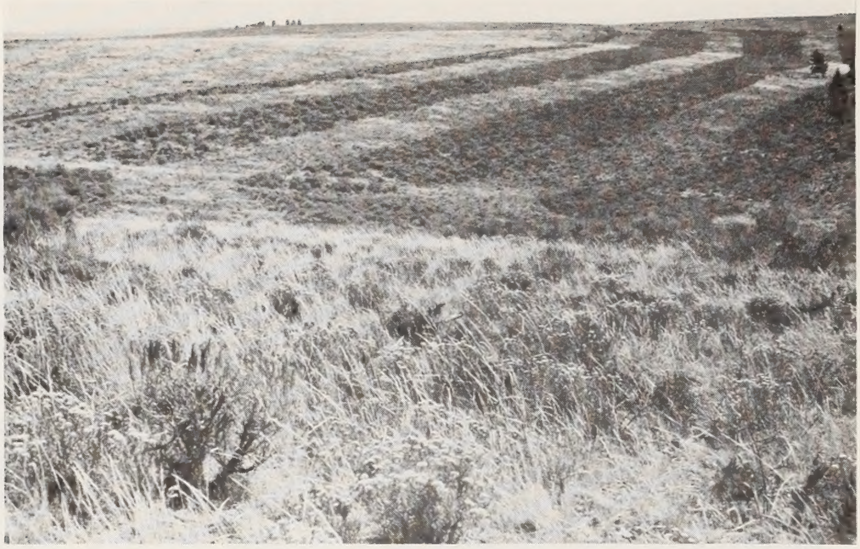


Figure 3-3. Brushbeating in sagebrush on Brush Mountain Allotment (no. 705). Note the untreated strips. These strips should have followed land contours to eliminate the straight-line effect. This area was treated in 1967.

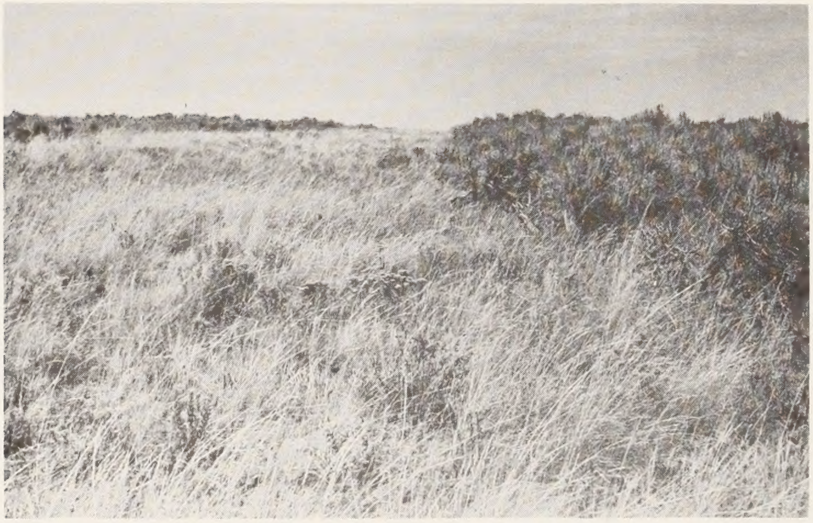


Figure 3-4. Brushbeating on Brush Mountain Allotment. Note the vigorous production of desirable grass species.

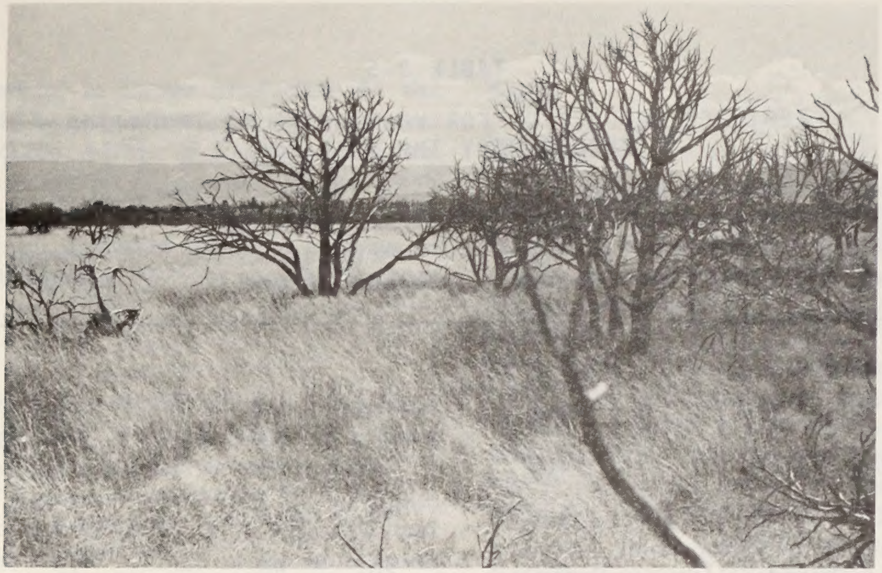


Figure 3-5. Burned areas in the Pine Ridge fire on Winter Flats Allotment (no. 713). This area, a pinyon-juniper and sagebrush site, was reseeded after the fire with desirable grass forage species. Seedling establishment was good and the forage production shown here for 1978 was excellent.

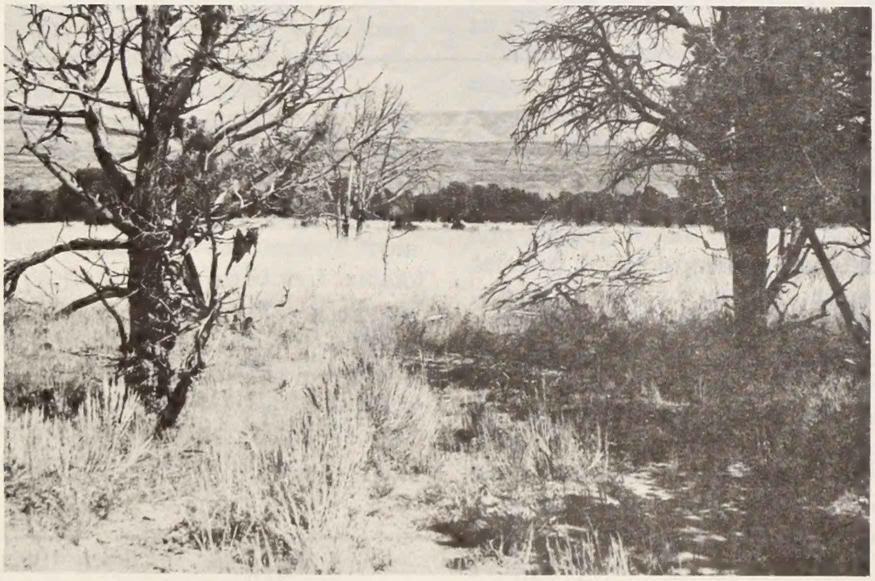


Figure 3-6. Pine Ridge fire on Winter Flats Allotment. Note the low forage production in the unburned pinyon-juniper (foreground) and high forage production in the burned area (background).

TABLE 3-5

PREDICTED PRODUCTION FOR VEGETATIVE MANIPULATION PROJECTS BY THE YEAR 2000

Allotment Name & No.[1]	Acres	Present		Predicted[2]	
		Ac/AUM	AUMs	Ac/AUM	AUMs
Chain & Seed					
E. Toms Cyn.(106E)	365	20	18	10	36
Spring Creek(115)	480	20	24	10	48
Whitewater Common(203)	2,000	17.5	114	9	222
Gibbler Common(301E)	1,000	20	50	10	100
Winter Flats(713E)	80	20	4	10	8
Totals	3,925		210		414
Thinning					
Wright Draw(405)	80	10	8	5	16
Spears(703)	500	20	25	10	50
Round Mountain(745)	1,900	10	190	5	380
Totals	2,480		223		446
Burning					
Bull Hill-Maverick(407)	1,000	10	100	5	200
Brush Beating					
Kimball(724)	270	7	39	3	90
E. Salt(602E)	1,000	15	67	7	143
Henderson/4A Ridge(723)	1,130	1.5	753	1	1,130
Winter Flats(713E)	1,030	15	67	7	147
Totals	3,430		926		1,510

[1] E = existing AMP.

[2] These are conservative estimates based on applicable available information and field observations of existing projects.

11 percent increase in forage production by the year 2000 would be a significant improvement over the present 109,705 AUMs of forage production.

Increases in forage production would also result in direct impacts on soils, wildlife, livestock, recreation, and cultural resources. In-depth analyses of these impacts are located in these sections in chapter 3.

Conclusion

The proposed action would change 7,355 acres of pinyon-juniper and mountain shrub to a grass vegetation type. In addition, 93 acres would be removed from vegetation production due to implementation of range facilities. It is estimated that range condition would change about as follows: good, from 18 percent (216,885 acres) to 48 percent (575,395 acres); fair from 47 percent (566,403 acres) to 38 percent (458,955 acres); and poor from 35 percent (417,569 acres) to 14 percent (166,507 acres). The trend in range condition would be upward on approximately 92 percent of the area and static on the remaining acreage. Vegetation forage production is predicted to increase by 11 percent (15,357 AUMs) by the year 2000.

Impacts on Threatened and Endangered Plants (Proposed)

Due to a lack of phenological data on these plants, predictions of beneficial or adverse impacts are highly speculative. Any action which is detrimental to these plants would probably be a long-term, moderate or major impact, depending on the ability of the affected plants to recover.

Vegetation manipulation projects and range facilities are not proposed in areas where proposed threatened and endangered plants are known to occur. The survey procedures required as part of the proposed action would prevent impacts from these projects on proposed threatened and endangered plants in presently unknown areas of occurrence. The possible impact of intensive grazing practices is impossible to predict with the current data base available for these plants. Actual impacts can only be determined at this time through monitoring of the changes occurring in the area.

Conclusion

With the currently available data and knowledge, the best prediction that can be made is that no significant impacts would occur to any threatened or endangered plant species or their critical habitat.

Soils

Introduction

Soil properties (characteristics) are considered separately from erosion condition, as was done in chapter 2. The erodibility of soil may be viewed as a soil property or as arising from soil properties. Erosion condition is a composite of inherent soil erodibility and biotic factors. The most important biotic factor is the ground cover of vegetation and litter. Soil compaction, a human influence upon erosion condition, is also considered. Soil compaction has been incorporated into the hydrologic model and would result in changes in runoff and sediment yields (see the Water Resources section). Sediment yield, which is discussed in the Water Resources section, is distinguished from onsite erosion, which is soil movement on a specified location. Changes predicted in vegetation are detailed in the previous section.

The impacts of the proposed action are discussed according to their specific effects upon soil properties. The ultimate impacts are measured by the changes in erosion condition.

Impacts on Soil Properties

The implementation of grazing systems would have area-wide, long-term, beneficial impacts to soils. High density grazing would increase the rate of range defoliation and trampling of vegetation and the soil surface. However, its counterpart, the rest during critical growth periods, would result in an overall improvement of soil conditions.

With an improvement of plant vigor, reproduction, seedling establishment, and litter accumulation, the organic matter content in surface soils would increase. This, in turn, would improve soil structure, infiltration, permeability, porosity, and soil productivity. Impacts to soils from rest rotation grazing would be more pronounced than with deferred rotation grazing since at least one pasture would receive no grazing through an entire year.

Best pasture grazing would probably be the best grazing system for soils. Since the poorest pasture would always be rested through the entire grazing season, surface disturbances to soils caused by livestock would be eliminated during that time. This would enhance the improvement of soil properties.

On the other hand, some minor impacts to soils could occur because a pasture could be repeatedly grazed for several years. Since portions of both allotments have fine textured, strongly saline soils, these soils, being less tolerant to vegetation removal and trampling, could have increases in erosion rates.

Litter accumulation would be less if the same pasture were grazed repeatedly for several years. This would result in a decrease in the rate of organic matter accumulation in surface soils. The chemical, physical, and biological properties of these surface soils would show less improvement than would occur under a rest rotation plan. However, it is important to note that range trend is apparently upward on Winter Flats Allotment (713), which is presently being grazed under a best pasture system.

The movement of livestock among the pastures created in this plan is expected to offset adverse effects caused by grazing an area every year. Livestock would not be allowed to overgraze any one pasture. The continuous monitoring required by the best pasture system would insure no more than 50 percent utilization of forage.

Chaining 3,925 acres on five allotments would create localized, short-term impacts to the soil resource. The structure of surface soils would be altered. Double chaining with windrowing could increase permeability of surface soils from the 0-2 and 2-4 inch depths (Gifford and Tew 1969), but infiltration at the soil-air interface could decrease (Gifford 1975). Mechanical equipment could cause some compaction to the surface soils. Adequate data is not available to quantify these impacts. Since the acreage involved for chaining and seeding would be small in relation to the total ES area, these localized impacts would have negligible effects areawide.

The burning of 1,000 acres on Bull Hill-Maverick Allotment would cause a localized, short-term impact to the soils' physical, chemical and biological properties.

Burning would definitely provide for the least amount of protection for soils of all vegetative treatments due to the percentage of bare ground. Raindrop impact on surface soils after vegetation and litter has been removed could be significant (Nichols and Gray 1941).

Burning would decrease soil infiltration rates (Buckhouse 1975). The reduced infiltration rates would cause soils to erode faster and remove some nutrients which have been mineralized by the fire. After the burn, concentrations of calcium and magnesium could be greater in the surface soils and the water-soluble potassium concentration could be less (Campbell et. al. 1977). Total nitrogen could be lower in soils of the burned area (ibid.). Any decrease in these nitrogen-limiting soils would be detrimental to soil productivity.

Bare surface soils would increase evaporation rates (Shown, Lusby, and Branson 1972). This would reduce soil moisture, thereby retarding seedling emergence and plant growth. No data or methods are available to predict the magnitude of these changes.

Construction of range facilities would involve short-term, mechanical disturbance to 434 acres of soil and long-term disturbance to 93 acres.

Where surface soils would be stockpiled for rehabilitation during the construction of water developments, the soil structure would be altered, thus altering porosity, infiltration, and permeability. Mechanical equipment would cause only slight compaction to the surface soils. However, compaction due to raindrop impact on surface soils after removal of vegetation and litter could be significant (Nichols and Gray 1941).

There would be a short-term, localized reduction in soil productivity because of the temporary surface disturbance during construction of the range improvements. This loss in soil productivity would result in a corresponding loss in vegetation production.

Since soil properties would improve, soil erosion would decrease. This reduction in erosion would be reflected in the erosion condition classes (soil surface factors).

Impacts on Erosion Condition

The expected change in erosion conditions for each intensive AMP was estimated by BLM range conservationists. The predicted change was determined through comparing areas with similar climatic and topographic conditions, soils, and grazing systems. Seven surface features were evaluated to determine the predicted change in erosion condition class (chapter 2). In many instances, the soil surface factor would improve enough to move into the next erosion condition class. Due to the proposed action, the severe erosion condition class would loose 1,263 acres to the next less severe class, which in turn would have a net loss of 125,804 acres to the moderate erosion condition class. Table 3-6 shows the expected improvement aggregated for all public lands in the ES area by the year 2000.

Table 3-7 compares the present erosion condition classes under each management plan with those predicted under the proposed action. These condition classes consider the high geologic erosion rates common in the ES area. Appendix 8 details erosion condition class information for each allotment proposed for intensive management.

The expected improvements in erosion condition classes would result in improved soil productivity. This cannot be quantified, however, since the precise relationship between erosion and productivity is not known.

Approximately three-fourths of these 88 allotments would remain in their present erosion condition classes. The erosion condition of the remaining allotments would move into adjacent classes, even though the change in SSF would only be two or

TABLE 3-6

EROSION CONDITION CLASS PERCENTAGES

	Present		Future (2000 A.D.)	
Erosion Condition Class	Acres	Percent	Acres	Percent
Stable	41,879	3.7	53,142	4.7
Slight	234,233	20.9	442,835	39.5
Moderate	560,633	50.0	473,125	42.2
Critical	256,294	22.8	130,490	11.6
Severe	28,608	2.6	22,055	2.0
Total	1,121,647	100.00	1,121,647	100.00

NOTE: Excludes 88 less intensive management allotments.

TABLE 3-7

PRESENT AND PREDICTED EROSION CONDITIONS BY MANAGEMENT PLAN

Management	PRESENT Condition Classes (Acres)					PREDICTED Condition Classes (Acres)					
	Stable	Slight	Moderate	Critical	Severe	Stable	Slight	Moderate	Critical	Severe	TOTALS
AMPs(Intensive)	41,879	234,233	557,643	246,842	25,163	53,142	442,835	470,135	121,038	18,610	1,105,760
Deferred Rotation	17,108	130,365	240,210	135,751	3,402	26,130	222,882	213,290	61,132	3,402	526,836
Rest Rotation	24,771	101,708	291,026	103,679	13,851	27,012	206,610	237,915	52,245	11,253	535,035
Best Pasture	0	2,160	26,407	7,412	7,910	0	13,343	18,930	7,661	3,955	43,889
AMPs(Less Intensive)1/	(8,295)	(20,715)	(27,892)	(22,208)	(100)	--	--	--	--	--	(79,210)
Elimination of Grazing	0	0	2,990	9,452	3,445	0	0	2,990	9,452	3,445	15,887
TOTALS	41,879 (50,174)	234,233 (254,948)	560,633 (588,525)	256,294 (278,502)	28,608 (28,708)	53,142	442,835	473,125	130,490	22,055	1,121,647 (1,200,857)

1/ Data gaps; see text for explanation. Known sums appear within parentheses.

three points. This is due to the proximity of these soil surface factors to class boundaries. Approximately one-third would move into the next better erosion class, while two-thirds would move to the next worse class.

Future erosion condition classes for less intensive management allotments have not been displayed in table 3-7 due to data gaps in three of the eight planning units and to the misleading nature of the information regarding changes in erosion condition classes. It is noted that while an increase in two or three SSF points has no practical significance in itself, a continued downward trend would be significant over a longer period of time, i.e., beyond the year 2000.

Since the areas proposed for elimination of grazing have been lightly grazed in the past, no change in erosion condition is expected.

Double chaining with windrowing would initially increase onsite erosion. Table 3-8 portrays increases in erosion rates during the first year following treatment. Estimated erosion rates cannot be quantified after the first year. The rates would depend upon the percentage of ground cover added each year from the seeding. The erosion rates would decline to the original rates approximately five years after the treatment.

The onsite soil erosion rates were estimated by utilizing the Musgrave equation, which is found in BLM Manual 7317 (Musgrave 1969) and given in appendix 3. These estimates are for sheet erosion only and are based upon established soil series (Soil Conservation Service). The range of onsite erosion rates are for the soil erodibility factor of each soil series found in that soil association where the chaining and seeding would occur.

Onsite erosion rates would decrease in the long term as ground cover (vegetation and litter) increased. Seeding would result in a long term beneficial impact.

Since the percentage change of bare soil with these treatments would be less than 10 percent, little or no change in onsite erosion would be expected.

Burning would initially increase onsite erosion. Presently, onsite erosion of the one allotment scheduled for burning, Bull Hill-Maverick, varies from 0.4 to 1.4 T/Ac/Yr (this range in onsite erosion includes the least through the most erodible soil found on the allotment). During the first year following the burning treatment, ground cover (vegetation and litter) would be decreased, causing the increase in onsite erosion. This increase (table 3-8) for the first year would range from 2.9 to 11.2 additional T/Ac/Yr. The greater erosion rates would occur on the steeper slopes.

Estimated erosion rates cannot be quantified after the first year. The rates would depend upon the percentage of ground cover added each year after the treatment. The erosion rates would decline to original rates approximately five years after the treatment.

These estimates are for sheet erosion only. Onsite erosion rates would decrease in the long term as ground cover (vegetation and litter) increased. Since the acreage proposed for burning is a very minor percentage of the total ES area, these localized impacts would have negligible effects areawide.

The construction of range improvements would initially increase onsite soil erosion due to a decrease in ground cover (vegetation and litter). The projected increase in onsite erosion for the first year varies from 219.2 to 413.4 T/Yr. This range in onsite erosion includes the least and most erodible soils found on the allotment. Appendix 8 shows the expected rates of increase (during the first year following construction) in onsite erosion for each allotment where range facilities are proposed.

Estimated erosion rates cannot be quantified after the first year. The rates would depend upon the percentage of ground cover added each year following the range improvement project. The erosion rates would decline to their original values approximately five years after project completion.

There would also be a long-term, annual onsite erosion rate ranging from 38.3 to 60.8 T/Ac/Yr attributable to the 8.1 miles (19.6 acres) of proposed roads and trails. Table 3-9 shows the projected increases in onsite erosion of the roads and trails.

The estimates of onsite erosion are for sheet erosion only. The range of onsite erosion rates are for the soil erodibility factor of each soil series found in that association where the range facilities would occur.

Range facilities could lead to decreased erosion rates in some instances due to the more even distribution of livestock.

Since the acreage involved for the range facilities would be minute in relation to the total ES area, these localized impacts would be small area wide.

Conclusion

Overall, implementation of the proposed action would result in decreased erosion and improvement in erosion condition classes.

The proposed grazing systems, pertaining to 92 percent of the public land would cause the greatest share of the improvement in soil properties (characteristics) and erosion condition.

Three-quarters of the allotments prepared for less intensive management and the two areas having livestock grazing eliminated remain in their present erosion condition classes. In no case would

TABLE 3-8

ESTIMATED FIRST YEAR INCREASES IN ONSITE EROSION FROM PROPOSED CHAINING AND BURNING TREATMENTS

Allotment Name and No.	Acres Proposed for Treatment	Present On-Site Erosion1/ (T/Ac/Yr)2/	Estimated Future On-Site Erosion1/ with Proposed Implementation (T/Ac/Yr)2/ During First Year Following Implementation	Net Change in On-Site Erosion1/ (T/Ac/Yr)2/ During First Year Following Implementation	Net Change in On-Site Erosion1/ (T/Yr)2/ During First Year Following Implementation
106 East Toms Canyon	365	1.9 - 7.3	5.7 - 21.4	3.8 - 14.1	1,287 - 5,146
115 Spring Creek	480	0.4 - 1.5	1.6 - 5.9	1.2 - 4.4	576 - 2,112
208 Whitewater Common	2,000	1.6 - 2.1	4.7 - 6.1	3.1 - 4.0	6,200 - 8,000
301 Gibbler Common	1,000	1.2 - 3.6	3.4 - 10.5	2.2 - 6.9	2,220 - 6,900
407 Bull Hill-Maverick Common	1,000	0.4 - 1.4	3.3 - 12.6	2.9 - 11.2	2,900 - 11,200
713 Winter Flats	80	4.7 - 9.1	14.9 - 29.0	10.2 - 19.9	816 - 1,592
TOTALS	4,925	10.2 - 25.0	33.6 - 85.5	23.4 - 60.5	14,079 - 34,950

NOTE: Erosion rates were estimated by the Musgrave equation (see appendix 3). Estimates are for sheet erosion only and based upon SCS established soil series. The range of erosion rates are from the soil erodibility factors of the soil series in the soil association where treatments would occur. (Musgrave 1969).

1/ Ranges in erosion figures include the least and the most erodible soils found in individual allotments.

2/ T/Ac/Yr = tons per acre per year and T/Yr = tons per year.

TABLE 3-9

ESTIMATED LONG TERM, ANNUAL INCREASES IN ONSITE EROSION FROM PROPOSED ROADS AND TRAILS

Allotment Name & No.	Miles Disturbed for Proposed Roads and Trails	Present On-Site Erosion1/ (T/Yr)2/	Estimated Future On-Site Erosion1/ (T/Yr)2/ with Proposed Roads and Trails	Net Change in On-Site Erosion1/ (T/Yr)2/ for Roads and Trails
Aubert Brothers (125-129)	1.5	1.8 - 6.9	4.3 -16.1	2.5 - 9.2
Palisade Flats (401)	0.6	0.4 - 1.4	1.7 - 6.5	1.3 - 5.1
Badger Wash (601)	1.0	0.9 - 1.4	6.8 -10.8	5.9 - 9.4
Kimball Creek & Mountain (722,724,729)	2.0	1.9 - 2.5	13.6 -17.7	11.7 -15.2
Round Mountain (745)	3.0	3.6 - 4.7	20.5 -26.6	16.9 -21.9
TOTALS	8.1	8.6 -16.9	46.9 -77.7	38.3 -60.8

1/ Ranges in erosion figures include the least and most erodible soils found in individual allotments.

2/ T/Yr = tons per year.

the soil surface factor changes exceed five percentage points.

Vegetation manipulation and range facility projects would result in local increases in erosion, but erosion rates would return to original rates within five years as vegetation became reestablished. Roads and trails would cause a long-term increase in erosion.

The inherent erodibility of a soil would not be affected by the proposed action, but the vegetal ground cover would be. The improvement in plant vigor predicted in the vegetation section would benefit all soils by the extension of roots, which would improve soil permeability and bind soil material to place. The improved plant production, which results from good grazing management and the improved soil structure creates more litter, which, in turn, improves infiltration. The net shift in livestock grazing from spring to fall would reduce soil compaction. All these effects would reduce surface runoff and the movement in soils.

Although the percent of change in the erosion condition classes by the year 2000 would not appear significant (particularly in the stable and severe condition classes), the soil surface factor, or current erosion activity, within the erosion condition classes would be significant. The reason for this is that the soil surface factor ranges 20 points in each erosion condition class. Thus, the soil surface factor of an area could be improved by 10 or 15 points and still remain within the same erosion condition class. The 80 percent increase in acreage in the slight and stable erosion condition classes, to 41 percent of the public land, is clearly a beneficial impact.

Water Resources

Introduction

For this ES, onsite erosion is discussed in the Soils section, while sediment yield is discussed in the Water Resources section. Onsite erosion is considered to be actual soil movement at a given location on a slope, while sediment yield is eroded soil carried to or within stream channels. Sediment yield includes both surface and channel erosion (channel erosion will be included in sediment yield unless otherwise noted). Channel erosion is generally much greater than onsite or surface erosion in this area. The methodology used for determining changes in runoff and sediment yield is presented in appendix 4.

Impacts on Water Quantity and Sediment Yield

Water resources impacts of grazing management on total seasonal runoff and sediment yield for each representative watershed are presented in table 3-10. These results are representative of and apply to the larger areas surrounding each watershed as shown in map 2-7. There would be no significant overall impact on water resources in the Upper Colorado River Basin because the local increases and decreases in runoff, sediment yield, and total dissolved solids seem to offset each other.

In general, increases in runoff and sediment yield would occur on allotments with concentrated livestock use during the spring and summer months, while decreases would occur on allotments with fall and winter use. Season of use would be the major factor contributing to the impacts rather than the type of grazing system. The major portion of these changes would be realized during the annual maximum event as shown in table 3-10.

With the exception of Rapid Creek Watershed, sediment yields presented in table 3-10 are similar to, or considerably less than, those presented in map 2-8. The values presented in the table are low because they do not include the channel erosion portion of sediment yield. The Universal Soil Loss Equation (USLE), which was used in this evaluation, is only capable of predicting surface erosion. Unfortunately, there is no practical method available for predicting channel erosion, so the USLE was used for the purpose of making comparisons and not estimating absolute sediment yields.

The two elimination of grazing areas would eventually experience a recovery of infiltration rates to pristine conditions. Runoff and sediment yield would decrease in the same manner as they would for areas showing improvement in table 3-10.

As described in chapter 1, 3,925 acres would be chained, seeded, and then rechained and windrowed. The water resources impacts of the proposed treatment would depend mainly upon the frequency and intensity of precipitation. Obviously, low intensity, infrequent rainfall, such as might occur in a drought year, would produce less change in runoff and sediment yield than what might be expected in a wet year. Gifford (1973) found that areas in Utah that had been chained, seeded, and windrowed produced roughly 1-1/2 to 5 times as much runoff and 2 to 6 times as much sediment as similar untreated areas. However, ten years after treatment the runoff was near normal.

Similar adverse results could be expected on the allotments to be chained, but it should be pointed out that these increases would only occur during runoff events. These runoff events would result primarily from the high intensity storms described in the climate section of chapter 2. Most of the additional soil moisture made available by the treatment would be evaporated or used by the increased grass cover which occurs after seeding. Since the areas to be chained are insignificant when compared to the total ES area and the drainage

TABLE 3-10

PROJECTED IMPACTS ON REPRESENTATIVE WATERSHEDS

Watershed	Total Runoff, Seasonal Ac-ft/sq. mi.		Total Sediments,1/ Seasonal Tons/sq. mi.		Annual Max. Runoff,2/ Ac-ft/sq. mi.		Annual Max. Disch.2/ cfs/sq. mi.		Annual Max. Sediment2/ Tons/sq. mi.	
	Present	Future	Present	Future	Present	Future	Present	Future	Present	Future
Lipan Wash(DR/RR)	0.97	0.71	566	440	0.78	0.61	2.90	2.26	486	392
N. Dry Fork(RR)	2.99	3.09	356	361	1.75	1.84	16.41	17.28	268	272
Gateway (DR/LI)	.69	1.26	52	89	.62	1.06	4.89	8.34	47	76
E. Salt Creek(RR)	2.93	2.20	109	67	2.13	1.71	16.90	13.59	82	54
Little Salt Wash(RR)	.98	1.20	19	21	.56	.65	2.49	2.87	12	12
Gibbler Common(RR)	2.37	3.18	962	1,146	1.87	2.41	3.76	4.84	786	919
Cone Mountain(DR)	1.18	1.17	364	332	.85	.85	6.50	6.50	236	214
Rapid Creek(DR/LI)3/	4.11	4.96	5,537	7,446	2.99	3.47	7.54	8.75	4,168	5,244
Little Horsethief(DR/RR)	1.35	1.06	482	306	.93	.70	4.54	3.43	401	255
Windy Creek(RR)	13.13	18.30	821	1,091	6.47	7.96	29.37	36.13	509	604
Ashford Canyon(RR)	.61	.71	185	187	.47	.56	5.01	5.87	147	149
Pollock Canyon(DR/RR)	6.19	5.51	740	613	3.07	2.60	16.60	14.10	416	322

NOTE: DR = deferred rotation, RR = rest rotation, and LI = less intensive managment.

1/ There is no practical method for predicting channel erosion, thus the Universal Soil Equation, which predicts only surface erosion, was used for comparison purposes and not for estimating absolute sediment yields.

2/ Based upon average maximum single precipitation event.

3/ Predicted sediment yields are probably exaggerated because the entire allotment was considered, but livestock would not likely use the steep slope common to this allotment.

basin in which they fall, the treatments would have negligible overall effects.

Brush beating and thinning would not be expected to alter runoff or sediment yield since soil disturbance is minor when compared with chaining. In addition, reseeding immediately after the fall treatment would result in additional grass cover the following spring. Any additional soil moisture made available by the treatments would be used by the increased grass cover.

Although fire has been used for a long time as a management tool, little scientific information is available regarding the hydrologic impact of this activity within range plant communities. Generally, hydrologic response of a site to fire will depend upon initial site characteristics, fire behavior, total area burned, and storm characteristics subsequent to burning treatment.

Local, short-term increases in runoff and sediment yield would be expected to occur on the 1,000 acres proposed for burning. However, due to the infinite number of initial site characteristics possible at the time of treatment, it is impossible to quantify the increases.

Since the 58 proposed reservoirs would be only a small portion of the total number of reservoirs in the ES area, they would have an insignificant overall effect on large streams and rivers. However, locally the reservoirs would be expected to decrease streamflow in the nearest drainage by 3 to 18 percent, depending on the particular area and storm size (Lovely 1976). Most sediment yielded from the watershed above the reservoirs would be trapped in the reservoirs for the life of the structures. If the reservoirs were not maintained, sediment trapped in the structures would be reintroduced into the system after a period of several years when the structures fail.

Water yields, as a result of spring development, would be expected to remain essentially unchanged, with the potential for increases of a few gallons per minute (gpm) in some cases.

Protection of springs from livestock would improve water quality by reducing bacteria counts and nutrients from animal feces down to background levels. There would be no measureable impact on ground water or ground water quality.

The four proposed wells would yield 5 to 10 gpm to a stock tank during pumping and would have a very minor impact on the ground water aquifer.

The 8.1 miles of stock trails would increase sediment yield. This would have a long-term, major impact in localized areas. Runoff is expected to double, resulting in a long-term, beneficial impact to surface water quantity.

Impacts on Water Quality

The impact of the proposed action on the salinity of the Colorado River was determined by calculating the total change in runoff and salt load based upon the hydrologic model and average salt load based upon the hydrologic model and average salt concentrations presented in the DSC Salinity Report BLM 1978. The predicted changes in runoff and salt load were routed through the Colordo River from above Parker Dam on the Arizona-California border to Imperial Dam one hundred direct miles south to arrive at the change in salt concentration at Imperial Dam as presented in table 3-11. These two dams are monitoring points with water quality standards for the Colorado River. The changes would be insignificant.

Changes from vegetation manipulation in chemical water quality would be minimal and should pose no problem. If changes did occur, phosphorus and potassium would be likely to increase during streamflow, but these increases would be of no consequence.

Local, short-term changes in water quality could be expected after burning. Calcium, magnesium, potassium, and nitrogen compounds could be expected to increase up to fifteenfold in a flushing type action during the first post fire runoff event. These concentrations would decrease rapidly as the watershed conditions became stabilized. The impact on ground water and ground water quality would be negligible.

Evaporation of water in the reservoirs would increase total dissolved solids (TDS) in that water and have a moderate, long term impact on water quality. The amount of increase in TDS would depend on a number of unpredictable climatic factors at each reservoir.

Ground water recharge would increase along with a decrease in ground water quality, but the amounts would be undetectable within the aquifers affected.

Conclusion

Local short-term runoff and sediment yield would increase due to soil disturbance caused by vegetation manipulation projects and some range facilities. Livestock use in the spring and summer months would cause an increase in runoff and sediment. Decreases would occur due to fall and winter livestock use. The overall effect would be a slight decrease in runoff and thus in sediment yield. The predicted increase of salinity in the Colorado River due to all the actions proposed is immeasurably small. Therefore, changes from all aspects of the proposed action would not significantly impact water quality in any perennial stream in the ES area.

TABLE 3-11

TOTAL DISSOLVED SALT CONCENTRATION

	Present Flow 1000 ac/ft	Predicted flow 1000 ac/ft	Present Total Salt -- Tons	Predicted Total Salt Tons	Present Concentration mg/l TDS	Predicted Concentration mg/l TDS
Above Parker Dam	9375	9375.016	10,106,000	10,106,069	792.627	792.632
Below Parker Dam	8232	8232	8,873,875	8,873,922	792.627	792.632
At Imperial Dam	7208	7208	9,194,003	9,194,050	937.888	937.893

NOTE: An increase of 0.005 mg/l total dissolved solids (TDS) would occur at Imperial Dam as a result of the proposed action. This is a 0.0005% increase, which is both immeasurable and insignificant.

Wildlife

Introduction

Many effects of the proposed action would impact several forms of wildlife similarly; these are discussed first in this section. Impacts are stated for specific kinds of wildlife in the last part of the section.

Additional information is supplied in appendix 7 on every vertibrate species known in the area. This will enable the reader to pursue the study of impacts to a more specific level than will the following test.

Appendix 10 describes the specific impacts of the proposed AMPs on the wildlife habitat for each individual allotment. It was not possible to quantify impacts on wild animal populations for each allotment since reliable population estimates were not available by allotment. This situation is further complicated by the mobility of many wild animals.

Appendix 11 shows the predicted future condition of aquatic and riparian habitats after full implementation of the AMPs.

Impacts Common to Many Wildlife Forms

The proposed AMP grazing systems -- rest rotation, deferred rotation, and best pasture--have resting built in. Within a rested pasture, all forage would be available for wildlife food and cover. However, in order to obtain rest in one pasture, the systems are usually designed to utilize the forage in at least one other pasture each year. Livestock are forced to utilize all types of forage up to a prescribed limit in this pasture, resulting in new shortages to wildlife. Due to the more uniform utilization, some forage previously used by wildlife would be consumed by livestock. However, the overall long-term effect would be the provision of better food and cover for wildlife as range condition improves.

As range condition improved with grazing management, vegetation litter and production would increase, increasing the probability of wildfires. This would be a localized, long-term impact. The effects of this would be adverse or beneficial, depending on circumstances. A wildfire on crucial winter range destroying needed cover would be a major impact, while, in another case, rejuvenation of browse through fire may be beneficial.

Many animal species appear to gain from nongrazing, while others are favored by overgrazing (Smith 1940, McCulloch 1962, Larrison and Johnson 1973). Yet most animal species that have come under rest rotation studies have been seen to be favored by this land treatment. Tables 3-12 and 3-13 were synthesized from many reference sources (Taylor et al. 1935, Reynolds and Haskell 1949, Martin et al. 1951, Howard 1953, Nerney 1958, Burt and Grosenheider 1964, McKeever 1964, Harris [French] 1971, Larrison and Johnson 1973, Vaughn 1974, Turkowski and Watkins 1976, Lambeth [M.S. Thesis] 1977, DeGraaf 1978, and M. Schroeder [USFWS], personal communication 1978) and corroborated with BLM experience.

The factors considered in the tables were food and cover changes arising from predicted changes in forb and grass density and composition. Other factors may obscure the response predictions in the tables, e.g., favored competitors, parasites, or predators; importance of woody species; social behavior which limits population; and incomplete information.

Some sources have appeared to conflict, as in the case of the pocket mouse. Martin et al. (1951) list seeds, primarily from weed plants, as the mainstay of pocket mice, whereas Reynolds and Haskell (1949) found Price and Bailey pocket mice most consistently on vigorous stands of perennial grasses.

Implementation of the 88 AMPs (less intensive) would not significantly alter present condition and trends. Deer and elk would continue to increase in these areas as they would throughout the ES area. Any improvements in wildlife habitat which would occur as a result of grazing management on regular AMPs may occur on less intensively managed AMPs, but a longer time period would be involved.

Elimination of grazing from the two elimination of grazing areas -- Grimsby and Moffatt Canyons (Dolores River area) and Sewemup Mesa -- would eliminate any possible competition between livestock and wildlife. All forage would be reserved for wildlife. Livestock use of these areas in the past has been minimal, so significant impacts are not expected.

A total of 3,925 acres would be chained and seeded. Effects on wildlife would depend on the species considered. The action would occur in the fall and, in the Whitewater Allotment, would involve a deer winter concentration area.

Cover type within the chaining would be converted from predominantly pinyon-juniper to blocks of pinyon-juniper mixed with converted areas seeded to grass and browse species. The area would be given two year's rest from livestock use, resulting in all forage being reserved for wildlife during this time. (See appendix 7 for information on species occurring in the pinyon-juniper type). After two year's rest there could be up to four times the amount of forage available for deer, elk, and other wildlife as well as for livestock. As a result of this increased forage, winter livestock distribution in the area would probably change, resulting in increased livestock use of the converted areas. This could result in possible increased com-

TABLE 3-12

IMPACTS ON MAMMALS

Benefited		Disadvantaged	
Species	Factors[1/]	Species	Factors[1/]
Masked shrew	1,7	Black-tailed jack rabbit	1,3
Bats (11 spp.)	7	Rock squirrel	3,4,12
Cottontail rabbit (2 spp.)	2	Least chipmunk	4
White-tailed jackrabbit	2	Ord's kangaroo rat	4
Yellow-bellied marmot	2	Deer mouse	4,8
Golden-mantle squirrel	2	Northern pocket gopher	3,12
Pocket gopher (2 spp.)	2,5		
Western harvest mouse	1,2		
Northern grasshopper mouse	1,7		
Woodrats (2 to 4 spp.)	2		
Voles (2 spp.)	1,2		
Western jumping mouse	1		
Gray fox	6,7,8,9		
Ringtail	7,8		
Black bear	2,5		
Long-tailed weasel	8		
Skunks (2 spp.)	6,7,8		
Puma	10		
Bobcat	6,8,9		
Wapiti	2,11		
Mule deer	2		
Pronghorn	2		

[1/] List of factors

1. Increased cover
2. Increased desirable herb food species
3. Decreased desirable herb food species
4. Decreased seed production
5. Increased tuberous and large thallus herbs
6. Increased ground nesting birds
7. Increased population of invertebrates
8. Stabilized rodent biomass
9. Increased medium-sized prey species, e.g., cottontails
10. Increased deer population
11. Refuge from livestock disturbance
12. Unknown factors

NOTE: Information on the Northern pocket gopher was taken from Laycock and Richardson (1975).

TABLE 3-13

IMPACTS ON BIRDS

Benefited		Disadvantaged	
Species	Factors[1]	Species	Factors[1]
Turkey vulture	1	Chukar	7, if cheatgrass decreases
Cooper's hawk	2	Say's phoebe	8 suspected
Buteos (4 spp.)	2	Horned lark	7
Golden eagle	1,2	Shrikes (2 spp.)	8
Marsh hawk	3,4,9	Rosy finches (1 to 3 spp.)	7
American kestrel	3,9	American goldfinch	7
Blue grouse	4,5,9	Vesper sparrow	7
Sharp-tailed grouse	4,5,9	Lark sparrow	7
Sandhill crane	5,9	Dark-eyed junco	7 on winter range
Long-billed curlew	4,9	White-crowned sparrow	7 on winter range
Mourning dove	4		
Great horned owl	2,3		
Short-eared owl	2,3		
Black-chinned hummingbird	6		
Broad-tailed hummingbird	6		
Common flicker	9		
Cassin's kingbird	9		
Dusky flycatcher	9		
Gray flycatcher	9		
Mockingbird	9		
Hermit thrush	4,9		
Western meadowlark	4,9		
Savannah sparrow	4		

[1] List of factors includes:

1. Increased carrion from increased large mammal populations
2. Increased medium-sized prey, e.g., cottontails
3. Stabilized rodent biomass
4. Increased nesting and/or foraging cover
5. Increased desirable herb species
6. Increased perennial flowering species
7. Decreased seed production
8. Decreased grasshoppers and allies
9. Increased arthropods of the type adapted to utilization

petition between livestock and wildlife for space as well as forage. The social interaction between elk and cattle might result in a decrease in the already light elk use. However, increased forage quality and quantity would probably reduce direct forage competition and maintain wintering wildlife populations in better vigor.

Islands of cover and irregular boundaries would increase usable wildlife habitat (edge effect). Although some nests and burrows would be destroyed, this is considered minimal since the breeding season would already be over. The windrowing of debris would create additional cover for small mammals and birds but would be an impediment to big game movements.

Assuming increased edge and islands of pinyon-juniper within chained areas, bird and small mammal diversity and numbers would be expected to increase. Some breeding birds characteristic of pinyon-juniper woodland are shown in table 3-14, column one. Provided remaining habitat blocks were large enough, these birds would be expected to continue breeding in the area after chaining, although perhaps in reduced numbers. After chaining, breeding birds listed in column two would be expected to increase from existing populations or immigrate into the area.

Brush beating is proposed for 3,430 acres. These areas consist mostly of mountain shrub with small amounts of sagebrush. At present, the vegetation is so dense as to limit available forage production for big game. Mule deer and elk use these areas, although elk use is low.

Sage grouse also occur on both allotments; removal of sagebrush would have a moderate impact on Kimball Allotment (724). The flock on 4-A Mountain Allotment (723) could be lost if the sagebrush parks were treated along with the serviceberry thickets. This would be a long-term, localized impact.

An increase in forage production as a result of treatment would cause increased use by wildlife. Increased use on treated areas might decrease use on adjacent poor condition areas, allowing some improvement.

Habitat for small birds and mammals would be severely disrupted during implementation, so a decrease in numbers and diversity is expected. Bird diversity is more strongly correlated with foliage height diversity than the actual foliage composition (Balda 1975). The conversion of a layered brush complex into a low-layered grass type would decrease the diversity of birds in the immediate area. Increased edge effect would partially mitigate this impact and vegetal recovery should occur quickly.

A total of 2,400 acres on Spears and Round Mountain Allotments are proposed for thinning. This would have the effect of increasing understory herbage production, providing more available forage for wildlife. These areas would probably cease to be used by big game as escape cover, but additional cover would be provided for small animals in the form of fallen trees.

Thinnings would result in increased use of the area by livestock, which would have the effect of increasing livestock/wildlife competition. Increased forage production as a result of thinnings would reduce and possibly offset any increase in competition. Increased forage plus dry debris from thinning operations would increase the probability of wildfires.

All proposed thinnings lie within crucial mule deer and elk winter ranges. In the short term, thinning, which would result in the removal of all but 10 to 30 trees per acre, would reduce available pinyon-juniper browse used by the animals during cold winter months and reduce protective cover (Hubard and Hansen, 1976, documented the importance of pinyon-juniper browse to deer). This reduction in food and cover could place deer and elk under more stress if these factors are limiting. In the long term, more palatable browse species would probably be stimulated by reduced overstory competition, possibly offsetting the adverse impact of reduced cover and reducing the effects of winter stress. Forage production in the treated areas is expected to double within five to ten years in response to thinning.

Only one allotment, Bull Hill-Maverick, has a controlled burn proposed. Burning would be carried out in the spring or fall, depending on weather and vegetation conditions. Burning during the spring nesting season would be destructive to wildlife because nests and burrows would be destroyed, protective cover removed, and invertebrate food supplies greatly reduced. Fall burning would not be as harmful because young animals would be mobile enough to escape. Enough cover would probably remain to meet the needs of deer and elk.

Beneficial impacts would begin the first growing season after the burn with the emergence of more nutritious and available forage than that which existed before the burning. Benefits for wildlife would continue unless dense brush became reestablished on the site; the time required for reestablishment would vary widely, but, if allowed, would generally not exceed 30 years.

Some wildlife populations could be adversely affected through alteration of their existing habitat. This would constitute a localized, moderate impact.

Fifty-eight reservoirs are proposed for various allotments, resulting in a loss of 58 acres of original habitat. Fifty-eight acres of new habitat would be created, however, in the form of ponds, marshes, mudflats, and an additional 11 acres of riparian area (assuming a 10-foot-wide riparian border around

TABLE 3-14

CHARACTERISTIC BREEDING BIRD SPECIES ON PINYON-JUNIPER SITES

Non-chained areas	Chained areas
Gray flycatcher	Ash-throated flycatcher2/
Scrub jay	Say's phoebe
Pinyon jay	Horned lark
Plain titmouse	Rock wren
White-breasted nuthatch	Townsend solitaire2/
Blue gray gnatcatcher1/	Vesper sparrow
	Lark Sparrow
Gray vireo	Brewers sparrow3/
Black-throated gray warbler	

SOURCE: The Audubon Society of Western Colorado.

1/ Highly dependent on woody plants, sagebrush is adequate.

2/ Dependent on a few trees within home territory.

3/ Sage brush dependent, thin stands adequate.

each reservoir). This would result in increased use of the area by various wildlife species. An increase in insects attracted to water would provide additional food for insectivorous birds and bats. More predators may be attracted to the area, resulting in decreased nesting success for small birds and mammals.

Increased water availability is likely to lead to overuse of the immediate area by livestock, leading to destruction of forage, trampling of ground nests, and damage to nearby trees through rubbing. However, reservoirs are expected to improve livestock distribution areawide, reducing pressure on some overused areas.

Reservoirs are expected to locally decrease streamflow in the nearest large drainage by 3 to 18 percent, depending on the area and storm size (Lovely 1976). There would be a minor impact to perennial streams that would normally receive the small volume of water retained by the reservoirs.

Six water catchments are proposed for five allotments, each catchment requiring approximately two acres of habitat. Water catchments would provide more reliable sources of water for wildlife, and the area fenced off from the catchment basin would be reserved totally for small wildlife species.

The immediate area around troughs provided for livestock would be trampled and overused. The increased availability and reliability of water would, however, provide a greater diversity of wildlife species.

As with reservoirs and catchments, actual construction of 34 spring developments and four wells would disturb wildlife. However, the increased availability and reliability of water supplies would be beneficial to terrestrial wildlife. Fencing the spring sites would have the effect of reserving the wet meadow vegetation exclusively for wildlife; livestock overuse and trampling would shift from the spring to the area around the water troughs. Development of springs could result in the collection of all available surface water, drying up sources of water for existing wet meadow vegetation.

A total of 138 miles of pipeline is proposed for fourteen allotments. One hundred sixty-seven acres of habitat would be disturbed during the construction phase. Pipelines installed within live stream channels would cause increased turbidity and sedimentation during the construction process. As with other water developments, increased availability and reliability of water supply would be beneficial to wildlife. Vegetation would be continually disturbed around watering troughs due to increased livestock concentration. Nesting success of ground nesting birds may be lowered due to trampling.

A total of 128 miles of fence are proposed for 47 allotments, with 155 acres being occupied by the right-of-way. Although generally not a major problem to wildlife, fences would constitute a barrier to free animal movement, even when designed to minimize access problems for big game. A certain amount of death and injury could result when animals became entangled in fences or were cut by barbed wire. It is expected that not more than five big game animals would be lost each year to fence entanglement.

Several beneficial impacts would be realized. The fences would provide additional perches for predatory birds, aiding hunting success. A fence enclosure on the North Creek Allotment would protect the very small range of the *Nokomis fritillary* butterfly. No additional protection is needed for the black short-tailed swallowtail, as the plant it feeds on grows primarily in areas inaccessible to livestock.

Fences installed within stream channels would cause debris buildups during high flows, causing adjacent bank undercutting. Fences would beneficially impact springs and reservoirs by protecting them from trampling, eutrophication, and overgrazing by livestock.

A total of 8.1 miles of roads and trails are proposed for five allotments. The result would be the long-term loss of approximately 13 acres of wildlife food and cover.

Part of the five miles of trail proposed for Round Mountain and Kimball Allotments would pass through critical deer winter range. The increased human activity resulting from these trails may prove detrimental to deer already stressed by cold weather and poor forage conditions by increasing harassment and poaching. In addition, the increased accessibility of these areas to livestock as a result of these trails would increase deer/cattle competition.

The proposed roads and trails would affect only ephemeral stream channels. Approximately 1,000 feet of a stock trails on Palisade Flats Allotment (401) would be within or along a channel, resulting in negligible increases in sedimentation which would not affect aquatic wildlife in the Dolores River.

One mile of stock trail would pass through an active prairie dog town in the Badger Wash Allotment. Increased human activity as a result of this trail may have a negative affect on the prairie dogs and result in a decrease in the suitability of the area for black-footed ferrets. A T/E species survey would be done prior to construction of the trail. The U.S. Fish and Wildlife Service would be consulted if the survey indicated the continued possibility of an adverse impact.

Impacts on Deer, Elk, and Bighorn Sheep:

Allotments within deer winter concentration areas where proposed season of use differs from present use are shown in table 3-15. Allotments in which spring grazing would be modified to increase browse vigor and reproduction and increase plant growth include all those listed in table 3-15 except for Big Salt(501). These modifications would improve forage quality and quantity, which would result in healthier animals, increased natality, and decreased mortality from winter stress.

The three AMP grazing systems could have an adverse impact on big game by tending to shift the vegetation composition from browse (preferred deer and antelope forage) to grass. Many of the proposed AMPs have based the pasture rotation date on the important physiological growth stages of one to two key grass species. This practice would tend to favor those grasses, possibly at the expense of forbs or browse. It is believed that the increase in cool season grasses would be more important to wild ungulate nutrition than any potential loss in shrubs due to interspecific competition.

Elk, of all big game species, would gain the most from an improvement in livestock forage production. Even in winter, elk would prefer grasses to shrubs to the extent that palatable ones are available.

If bighorn sheep still exist within the ES area, the allotments they use are ones in poor to low fair range condition. The improvement of Sunnyside Allotment (801) could be very beneficial to their habitat. Bitterbrush, mountain mahogany, serviceberry, and tall cool season grasses should increase under the proposed action. These would be important foods to bighorns as they descended the Battlements in winter.

The proposed AMP grazing systems would have a slightly beneficial impact on pronghorn antelope in rested pastures, where all forage would be reserved for wildlife. Pronghorns would also benefit as vegetation density increased. Food habits are sufficiently dissimilar that competition in pastures being used should not be severe.

Most of the adverse impacts to wild ungulates from livestock grazing would not be created by the proposed action, but could be perpetuated by it. The impacts of livestock grazing are discussed below according to season. This is to detail the nature of impacts and does not imply that livestock grazing is necessarily incompatible with healthy wildlife conditions. The proposal is shown to be generally beneficial to most wildlife.

Spring livestock grazing results in decreased browse vigor and reproduction, reduced plant growth, and increased competition with wildlife during initial green-up, when forage is likely to be limiting. Due to increased competition, big game animals have to expend additional energy to locate new growth. This may result in death of old or winter-weakened animals, abortion of fetuses, and birth of weakened young.

Livestock use of rapidly growing herbs delays the phenological progress of the plants. In the lowlands receiving less than 14 inches of precipitation, this can cause the failure of the plant to take advantage of available soil moisture. In higher, wetter zones this will often benefit wildlife by allowing enough regrowth before moisture stress stops growth, fixing plants in a more nutritious state than they would have attained had they been allowed to grow to full stature.

Summer is a period of abundance. Competition is lowest between deer and cattle, even though herbs become more important to both species. Grazing in which no regrowth occurs or late summer grazing that removes the regrowth reduces the amount of forage available to wildlife during winter, increasing winter stress on wildlife wintering in these areas.

In the fall, as herbaceous plants decline in palatability, livestock begin to use browse more extensively. This increased browsing reduces available forage for wildlife. This is especially important where fall livestock grazing would occur on crucial winter areas (shown in tables 2-10 and 2-13). Reduced browse on winter concentration areas may result in serious malnutrition as deer and elk numbers increase. Insufficient forage for wintering animals would result in increased mortality, decreased natality, and possible changes in the herds' population structures.

Winter livestock use results in heavy dependence on browse as this class remains highest in digestible protein content during this season (Cook 1971). Grazing of winter concentration areas leads to the greatest competition for forage between elk, deer, and livestock. The greatest impacts would result from winter sheep use on crucial areas such as Lyons/Anderson and Whittaker Flats (811 and 754). Impacts on wildlife are similar to those indicated under fall grazing.

No allotments lying within elk winter concentration areas have season-of-use changes proposed. However, the concentration of livestock in grazed pastures would have the most pronounced impact where cattle use these areas during the winter.

Elk are occasionally seen grazing in close proximity to sheep and cattle. However, Pengelly (1977), Lonner (1976), Nelson and Burnell (1976), Knowles (1975), Mackie (1970), Skovlin et al. (1968), and Dalke et al. (1968) have all documented elk aversion to cattle. Accordingly, it is predicted that the majority of the elk would tend to move to the rested pastures. Undoubtedly, there would be

TABLE 3-15

SEASON OF USE CHANGES IN DEER WINTER CONCENTRATION AREAS

Allotment Name and Number[1/]	Present Use	Proposed Use
Deferred Rotation		
Whitewater (203)	04/15 - 06/17 10/01 - 01/30	04/20 - 06/30 10/01 - 01/13
Blue Mesa (406)	11/16 - 06/15	11/01 - 05/31
Ute Creek (410)	02/01 - 06/03	10/15 - 12/03
Buniger (505)	05/01 - 10/31	05/15 - 11/15
Burdick East of Ranch/Tater Hills (706)	04/16 - 06/09	05/01 - 05/31 10/01 - 10/31
White Mountain (808)	04/16 - 06/15	04/23 - 06/22
Rest Rotation		
Big Salt (501E)	04/01 - 12/15	12/01 - 09/30
Coal Gulch (502D)	05/09 - 11/07	05/18 - 11/07
Little Salt (507)	12/01 - 05/31	11/05 - 04/30
Coon Hollow (712)	04/06 - 06/10 11/01 - 12/31	
Best Pasture		
Winter Flats (713E)	03/01 - 06/15 11/06 - 02/28	04/10 - 06/15 11/16 - 02/28

NOTE: Livestock are cattle in all cases.

[1/] E = allotment with existing AMP and D = allotment with other pastures in deferred rotation system.

some use of the other pastures due to the tendency of elk to follow the same routes to the same areas year after year. Small elk populations in the ES area would not place extreme pressure on the vegetation in these rested pastures.

Elk would return to pastures following livestock use to graze the regrowth. The ability of elk to tolerate deeper snows would allow them to stay in higher elevation areas in the winter and to move up-country earlier in the spring than cattle.

IMPACT ON MOUNTAIN LION, BLACK BEAR, AND COYOTES:

Mountain lions and black bear would be influenced indirectly to the extent that prey species, mule deer and small mammals, are affected. This would be of limited importance to mountain lions due to the social regulation of population found in this species. Black bear would also be influenced directly by improved livestock forage because plant species used by livestock may also be eaten by bears. In any case, an increase in mule deer, small mammals, and vegetation would be likely to bring about an increase in populations of lions and bear.

Other mammalian predators, such as the coyote and bobcat, would be impacted in a similar manner. Reduced vegetation cover in used pastures would improve predator success upon small rodents, resulting in a localized, long-term, beneficial impact.

IMPACT ON SMALL MAMMALS

In rested and deferred pastures, forage would increase for herbivorous small mammals, such as lagomorphs and rodents, and cover would increase for all small mammals. A mosaic of small mammal populations of differing densities and species composition would be created, depending on the relative location of use and rest pastures. Although there may be little change in small mammal numbers, there would be a long-term increase in total species on the site.

The nonselective removal of plant growth increased by the grazing systems would increase livestock competition with small mammals, since small mammals are generally herbivorous (plant-eating) or granivorous (seed-eating). The proposed grazing systems would increase the food supply of small herbivorous mammals and indirectly raise the food supply of small insectivores through the increase in plants that are required for the development of insect populations. The extent of this impact is not known, but most species of small mammals and insects have been found to be more numerous where grasses and forbs provide substantial cover and there is a good density of herbaceous vegetation. Animal matter in the form of insects is a basic necessity for the survival of some species of mammals. The increase in vegetation would reduce the energy drain as the home range sizes required to support small mammals decreased. Granivorous species would likely diminish as the weedy plants, which are most seed prolific, were crowded out by perennial plants.

IMPACT ON BIRDS

Waterfowl would be directly benefited by the proposed action in those areas where permanent reservoirs or ponds are proposed. Gjersing (1975) found that duck production in north-central Montana increased in pastures under rest rotation grazing.

Native upland game birds are expected to be benefited by the proposed action. Short-term, beneficial impacts would be limited due to heavy utilization of grazed pastures. Removal of forage by livestock would increase competition, and, if the forms of insects important to young birds were disadvantaged by the grazing, young survival may decrease. However, the mobility of these birds is likely to offset any vegetation decline in grazed pastures. In the long term, as vegetation cover increases, native upland game species are expected to increase.

Sage grouse have not been studied sufficiently in the ES area to determine impacts of grazing on the small population that exists. Limiting factors other than grazing (and therefore beyond, the scope of this ES) may be holding the population at its current level.

Raptorial birds would be indirectly benefited through the proposed action. In grazed pastures, ground cover would be reduced, increasing hunting success. This would be a long-term, localized impact occurring in various pastures throughout the life of the grazing systems. As plant vigor and density increase, small herbivores and insectivores are expected to increase. An increase in prey populations would be beneficial.

As plant species composition changes to higher percentages of the more enduring plant species, the food supplies of the seed-eating birds are expected to be found more exclusively on the rested pastures. Cover would increase for all birds that use ground vegetation for escape, feeding, or nesting, which is a long-term, beneficial impact. If the grazing systems caused a change in species composition from browse to grasses, minor shifts in species composition of birds from shrub nesting species to grassland birds would be expected.

The concentration of livestock in grazed pastures and around water developments would cause localized, short-term increases in nest trampling. This would decrease somewhat as vegetative condition improved, but would continue through the life of the grazing systems and water projects.

Impact on Reptiles and Amphibians

All of the known reptiles and amphibians in the ES area are carnivorous or insectivorous. In addition to increased food supplies from a generally increased herbivore population, many of these cold blooded animals would gain increased shelter from the sun and protection from their own predators.

Impact on Anthropods

The grazing systems would result in a general increase in arthropods. Beetles, flies, true bugs, butterflies, moths, detritivores, and spiders would find advantages in increased litter, vegetation structure, and plant biomass. Perennial forbs would supply nector-bearing flowers for bees and sphinx moths during dry years when annual crops fail. Where grass stands outcompeted forbs, a decrease in bees and sphnix moths would be expected. Treherne and Buckell (1924) report that the reason many orthopterans (grasshoppers, crickets, etc.) increase with overgrazing is that egg laying is facilitated on bare areas.

I'll bet! R?.

Conclusion

Implementing the proposed action would result in a net population gain of about 1,457 deer and 13 elk in the ES area by the year 2000. Black bear, coyote, and bobcat populations would be benefited. An increase is predicted in the variety and annual stability of small mammals, birds, reptiles, amphibians, and arthropods on the intensively managed allotments.

About 16 percent of the existing stream aquatic habitat would improve, with the other 84 percent remaining essentially the same. The aquatic habitat of reservoirs would remain unchanged, except for the addition of 58 small reservoirs, with water quality maintained by fencing.

Overall, about 73 percent of the riparian habitat is predicted to remain unchanged, while 27 percent would improve. Specifically, 132.2 miles would remain unchanged, 18.3 miles would improve from fair to good, 14.7 miles would go from poor to good condition, and 13.8 miles would improve from poor to fair. A decline from fair to poor condition is foreseen for 2.3 miles. This would be a net overall improvement by the year 2000 of 46.8 miles of stream riparian habitat with the proposed action.

There are no adverse impacts predicted for the populations of threatened and endangered species. Some beneficial impacts could occur.

Impact on Aquatic and Riparian Wildlife Habitat

Livestock exhibit a strong preference for riparian zones for a variety of reasons. Cattle prefer the quality and variety of forage available. Riparian forage is higher in palatability because it has more moisture, whether it be shrubs, forbs, or grass. Moisture content, probably more than any other factor, influences palatability. A preferred species of forage growing on a dry hillside will not be as palatable for as much of the season as the same species growing in a riparian zone (Ames 1977).

After watering at a stream, it is natural for cattle to begin feeding on adjacent vegetation. Riparian vegetation turns greener earlier in the spring than more dryland range plants and maintain their vigor further into the autumn months (Johnson 1976).

There are many other reasons for livestock to frequent riparian areas. If the surrounding country is rough and rocky, livestock tend to concentrate along these riparian areas just to give their feet a rest (Ames 1977). Cattle seek the cooler, shady riparian areas for relief from summer heat and insects. Aquatic and riparian habitat is often located in valleys and cattle prefer to avoid exertion by remaining in the lower areas (Johnson 1976).

Grazing riparian plants at the wrong times and heavily utilizing riparian plants can cause riparian areas to decline and not recover. In woody plants (trees and shrubs), food reserves and growing points, which are located on stems and twigs, are exposed and available to grazers. Grazing these plants in fall and winter after their food reserves are stored and during their dormant period can limit the ability of the plant to regrow the following spring. Removal of more than 60 percent of crown can significantly reduce the growth potential of some species (Hormay 1970).

Overgrazing is one of several factors which may prevent the natural replacement of old cottonwoods by younger trees in riparian zones. Such use may be detrimental to wildlife, visual, recreational, or other values. The most certain way to preserve such values is to fence off the area from grazing. Reducing livestock or adjusting the grazing season may not solve the problem (Hormay 1976). However, along the Colorado River, the frequency of flooding riparian areas has been reduced by man-made dams, decreasing cottonwood regeneration and making grazing an irrelevant consideration.

In Arizona, Ames (1977) found there is no known system of livestock management that will give adequate protection to riparian zones. Even short-term or seasonal use is inadequate. Because these areas are usually extremely narrow and linear in character, grazing for only a few days can seriously impair the riparian reproductive capability. The only way to insure protection of riparian habitat, at least in desert areas, is apparently by fencing.

Two studies conducted by Platts and Rountree (1972) and Eckert (1975) question whether riparian vegetation can be restored on previously overgrazed pastures through the use of rest rotation grazing management systems. These authors concluded that riparian vegetation receiving one year of rest in a rest rotation system did not recover adequately. According to their findings, pastures may recover in some cases during a yearlong rest, but stream banks do not.

Figures 3-7 and 3-8 show the amount of vegetation that has appeared on Roan Creek Allotment (744) one year following the erection of an exclosure. It appears likely that each year of rest would begin from a better range condition following institution of rest rotation grazing. On this allotment, it is thought possible to improve stream banks by implementing a grazing system providing periodic annual rest.

Overall, it is concluded that the success of the three AMP grazing systems in improving range vegetation would not guarantee that all riparian and aquatic habitat within pastures of the system would be improved. Results of AMP systems would range widely from positive to negative. Each case would be unique and was therefore evaluated separately. Appendix 11 shows the predicted future condition of aquatic and riparian habitat on the allotments with AMPs twenty years after implementation of the proposed action.

Conclusion

The total condition is expected to improve on the allotments with AMPs. No overall change is expected in the present condition of aquatic and riparian habitat on the 88 less intensively managed allotments since present grazing practices would be continued. The two elimination of grazing areas would not be impacted by the proposed action because neither contains aquatic or riparian habitat.

THREATENED AND ENDANGERED SPECIES

There are no confirmed sightings of black-footed ferrets in the ES area. However, a number of prairie dog colonies exist, upon which ferrets depend. Apparently, overgrazing is not unfavorable to an increase in prairie dogs (Snow 1972). It is not known if grazing management along with improved range condition would cause a decrease in prairie dogs. Since the potential for a dense, inhibiting growth of tall plants probably does not exist where the white-tail prairie dog dwells, existing colonies should maintain themselves. There should not be any change, therefore, in potential black-footed ferret habitat.

Yeager (1938) identified large turbid rivers in the Mississippi-Yazoo Delta as the least suitable aquatic habitat for river otters. Turbid periods for most water courses suitable for otters are characteristic of this area. The proposed grazing plans offer a negligible reduction of sediment yield into the rivers. There is nothing seen in the proposed action to discourage the immigration or reintroduction of otters into the areas.

The proposed action would create no significant impacts to bald eagles. Consultation with the U.S. Fish and Wildlife Service in accordance with Section 7 of the Endangered Species Act of 1973 confirmed this assessment.

The grazing systems, along with range facility projects, would prove beneficial to the two known pair of nesting peregrine falcons. The proposed action would increase small mammal and bird diversity, resulting in a larger and more diversified prey base for these endangered birds.

The declines observed in the fifteen Blue List bird species (see chapter 2) are attributed to habitat destruction by urban expansion and agriculture, perticides, and unknown causes. Overgrazing was stated as one cause for the decline in Ferruginous hawks in the northern Great Plains (Serr, as quoted in Arbib 1977). The specific elements favoring this raptor of semiarid rangelands have yet to be determined. Raptors are expected to gain improved hunting opportunities by the proposed grazing systems.

The effect of grazing on the habitat of the Great Basin silverspot (*Nokomis fritillary*) has not been carefully documented. The early spring and late fall use of the seepage area by cattle has meant that willows have been heavily utilized. Some observers believe that the larval host plant, the kidney-leafed violet (*Violet nephophylla*) is surviving best under the willows. It has also been conjectured that grazing is important to butterfly oviposition by inhibiting the rank growth of rushes and sedges. The exclosure fence proposed is expected to help define the role of livestock grazing on the butterfly habitat. The rest rotation plan on the North Creek AMP would lessen cattle pressure.

The Section 7 consultation response of the U.S. Fish and Wildlife Service indicated that the proposed action "would stabilize flows and would provide limited silt reduction in the Colorado River". Therefore, the agency has determined that the proposed action "falls within this necessary action to protect Colorado River Fishes habitat" (FWS Memo: Section 7 Consultation - Grand Junction Grazing ES Area, 6/16/78).

There are six federally listed endangered species known to exist or possibly occurr in the ES area. The bald eagle is the only species which could possibly be adversely impacted. Cottonwoods, the primary large trees along the major river bottoms, provide the majority of hunting and roosting perches. As discussed under riparian and aquatic habitat, unavoidable overgrazing prevents the replacement of mature trees by younger ones. Over a period of time, groves of cottonwoods could be lost, reducing the availability of eagle perches.

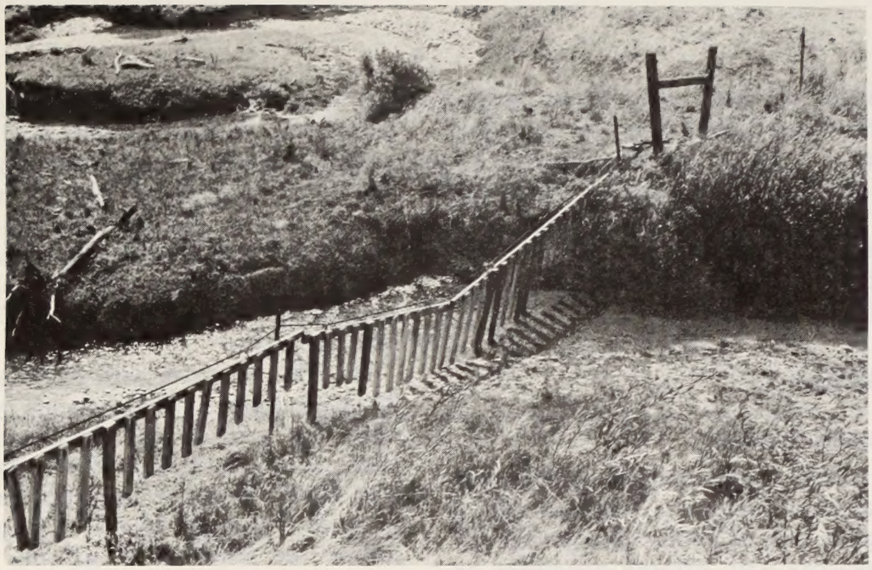


Figure 3-7. Riparian type on Roan Creek Allotment (no. 744). Note the vegetative response to resting from grazing on the right side of the fence.

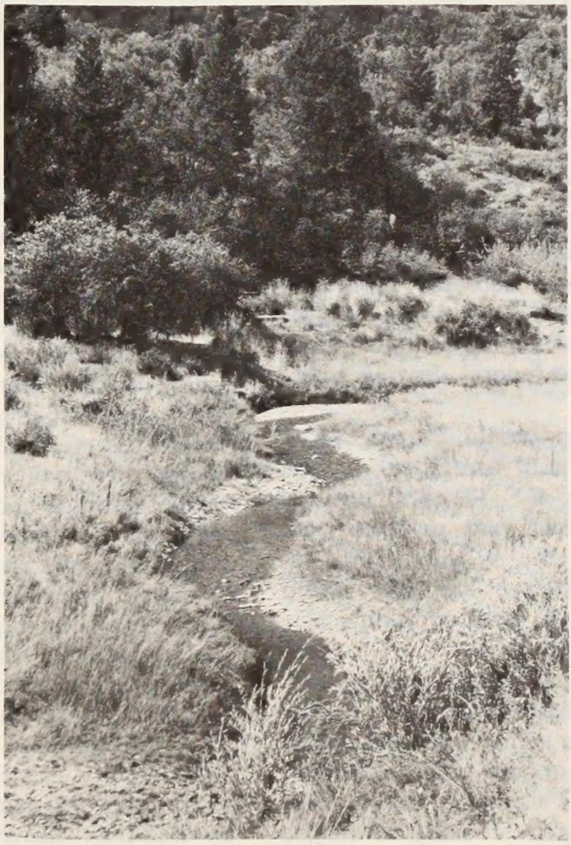


Figure 3-8. Riparian type. This view is inside an exclosure. Note good vigor and ground cover with only one year of rest from grazing.

However, no impact to eagle populations due to unavoidable overgrazing inherent in the proposed action is predicted.

There are no anticipated impacts to threatened and endangered fish species due to the small acreages involved and the localized nature of the impacts, along with the fact that these fish are located in the larger rivers.

Livestock Grazing

Impacts on Livestock Grazing

The proposed action would impact all livestock operators through more intensive management of livestock grazing on public lands administered by BLM. Those operators with grazing privileges on areas proposed to receive intensive livestock management through AMPs would receive more of an impact than those with grazing privileges on areas proposed for less intensive management.

The proposed action would initially reduce active qualifications from 94,822 AUMs (compiled from individual operator case files) to 82,139 AUMs, a decrease of 12,683 AUMs. As table 3-16 suggests, the reductions would involve 12,658 AUMs on 33 of the 78 proposed AMP (intensive) areas and 25 AUMs on the two elimination of grazing areas. Thirty-eight livestock operators would be affected, with 2 being affected both by a stocking reduction and one of the two grazing eliminations. The 29 percent decrease in the 38 operators' total qualifications, from 43,879 AUMs to 31,221 AUMs, would lower the value of their base property to which the federal grazing privileges are attached.

These livestock operators would become more dependent on other lands until forage production increases were realized on the 33 allotments. If other lands the operators own, rent, or lease were not capable of supporting the 12,683 AUMs removed from public lands, some operators would probably have to buy, rent, or lease additional pasturage or sell some of their livestock.

In the case of the six one-pasture rest rotation and deferred rotation systems, reductions of 33 percent (640 AUMs) in average annual use for a three-year cycle would severely impact eight individual operators (see table 3-17). This would be in addition to the initial reductions in stocking levels for six of the eight operators, and one of these six would also be impacted by the elimination of grazing on Sewemup Mesa. The actual degree of severity would depend on the quantity and quality of other private and public rangelands owned and leased by the operator. Smaller operators would be the most severely affected. However, in most cases it is probable that the operator could accommodate the necessary adjustment through a change in use patterns on privately owned land.

The loss of Sewemup Mesa and the 885 acres of the GML Allotment along the Dolores River would have a negligible impact on livestock grazing. The Dolores River area involves the loss of 1 AUM and Sewemup Mesa the loss of 24 AUMs, resulting in a total reduction of 25 AUMs of active qualifications.

All the operators with grazing privileges on the 89 AMP (intensive) allotments would have higher operating costs arising from increased herding of cattle and maintenance of proposed range facilities. The AMPs designate specific seasons of use on all proposed pastures of the allotments. In order to follow the sequence of grazing designed into the grazing systems, the operators would have to make more frequent visits to the allotments to gather and move livestock to the next pasture designated for use.

Less intensive management allotments designate only number of AUMs and season of use. The operators involved with these areas would be required to visit their allotments only twice -- once to move livestock on the allotment and again at the end of the grazing season to remove livestock from the area.

Although more frequent livestock movements from one pasture to the next would result in temporarily reduced weight gains, it is expected to be offset by the decreased distances to water. Initially, lower livestock weight gains and birth rates would be likely as less regrowth would be accessible to the animals, but performance would be regained as forage volume increased. The proposed water projects and fencing would improve distribution within pastures and reduce the amount of time and energy livestock would have to spend travelling between forage and water. Improved livestock distribution would also reduce grazing pressure on historically overutilized areas. Therefore, with the proposed water developments and fence construction needed for implementation of the grazing systems, improved distribution would occur and a subsequent improvement in range vigor and condition would result in an unquantifiable improvement in livestock condition and production. Fencing would also simplify gathering operations when operators move livestock and facilitate range administration by BLM by allowing easier detection and reduction of trespass problems.

Approximately 11,704 AUMs of additional livestock forage production is expected to become available for use by 2000. Due to dietary overlap between wildlife and livestock, 11,328 AUMs would be available for livestock use, with the remaining 376 AUMS being consumed by wildlife. Actual determination of which areas would receive

TABLE 3-16

ALLOTMENTS RECEIVING A REDUCTION IN AUMS

Allotment	Present Use	Proposed Use	Percent Adjustment
Deferred Rotation			
103 Haystack	153	57	63
105 South of the Road	57	30	47
113 Fessler	53	38	28
125 Aubert Brothers	1,995	1,919	4
145 Dugway	554	331	40
152 Round Knob	342	327	4
154 Lost Canyon-Sugar Bench	2,791	2,168	22
161 Coates Creek	26	22	15
163 King[1]	1,613	1,295	20
406 Blue Mesa	2,408	1,099	54
407 Bull Hill-Maverick	564	553	2
409 Sinbad Valley	766	641	16
411 Dolores River	356	103	71
420 GML	350	86	75
429 Dolores Point	1,001	910	9
503 Garr Mesa	2,645	2,439	8
506 Lapham Canyon	435	276	37
603 West Salt Common	8,187	2,949	64
604 Crow Bottom	244	211	14
702 Berry Homestead	218	215	1

TABLE 3-16 (continued)

Allotment	Present Use	Proposed Use	Percent Adjustment
732 Logan End Common	365	363	1
809 Wild Country Common	746	740	1
811 Lyons-Anderson	424	351	17
844 Lower Rapid/Cottonwood	279	278	< 1
Rest Rotation			
116 Bangs Canyon	2,578	2,458	5
202 Kannah Creek Common	3,698	2,741	26
504 Hunter Wash	1,411	1,148	19
507 Little Salt	2,734	2,199	20
601 Badger Wash	857	840	2
703 Spears	1,677	1,674	< 1
712 Coon Hollow	1,657	1,218	26
745 Round Mountain	1,148	727	37
Rest Pasture			
613 Rabbit Valley	1,547	815	47
Subtotal	43,879	31,221	(av. 29)
Eliminated Grazing			
Dolores River	1	0	100
Sewemup	24	0	100
Total	43,904	31,221	(av. 29)

1/ Allotment has 38 percent of present use in area proposed for rest rotation grazing.

TABLE 3-17

ALLOTMENTS RECEIVING ELIMINATED GRAZING EVERY THIRD YEAR

Allotment	Present Use	Proposed Use	AUMs Eliminated Every 3rd Year
105 South of the Road	57	30	30
113 Fessler	53	38	38
133 Reservation	122	122	122
161 Coates Creek	26	22	22
410 Ute Creek	260	260	260
610 Maluy	168	168	168
TOTALS	686	640	640

additional livestock use would be determined through the appropriate land use plan (MFP) when the actual increase in additional forage was achieved. First consideration would be given to those operators receiving reductions as a result of the proposed action in accordance with 43CFR 4110.3-1. It is estimated that livestock use would be approximately 93,467 AUMs by the year 2000. It is possible for livestock use to attain the present level of active qualifications, 94,822 AUMs, by the year 2005.

Conclusion

The proposed initial reduction of 12,683 AUMs in livestock grazing levels would affect 38 livestock operators. Increased cost of herding and range facility maintenance would also affect several of the operators associated with the intensive AMPs. These impacts would be considered long-term and minor to major, depending on individual livestock operations.

As a result of the proposed action, there would be an increase in range condition and forage production (11,704 AUMs (see Vegetation section). The AUMs that would be available for livestock use (11,328 AUMs) would result in an unquantifiable improvement in livestock condition and production. The proposed action would also increase the effectiveness of livestock gathering by the operators and the administration of allotments by BLM. These impacts are considered long-term and significant and would reduce the adverse impact on livestock grazing in the ES area by the year 2000. For a further discussion of impacts on livestock operators, see the Socioeconomic section.

Impact on Socioeconomic Conditions

Analysis of impacts in this section is accomplished by considering the ES area population affected, income (including range livestock-related income, contract construction-related income, recreation-related income, and government-related income), employment, public finance and tax base, social well-being, and social and cultural attitudes. Less intensive management allotments are not expected to result in impacts on these items since there would be no change in the present grazing system and no new investments in projects.

Impacts on Income

The proposed action would have impacts on range livestock-related income, contract construction-related income, government-related income, and recreation-related income as described below.

Under the proposed action, 33 allotments involving 38 operators would receive immediate reductions in stocking levels, 6 allotments involving 8 operators would receive elimination of grazing every third year, and 2 areas involving 2 operators would have grazing eliminated. There is overlap in the above. The operators receiving reductions are accounted for in table 3-18 with the 25 AUMs lost from the no grazing areas also built in. The forage use changes and income effects identified in this table are based on the reduced and eliminated grazing. Six of the 38 operators indicated in table 3-18 would also be impacted by elimination of grazing on six allotments every 3rd year. Two additional operators not part of the 38 ranches in table 3-18 would also be affected by the elimination every 3rd year for a total of eight operators. If the 640 AUMs lost every 3rd year had to be compensated for by feeding hay, the cost would be an estimated $11,136. This additional cost would mean a corresponding net revenue reduction for the eight ranches involved and, if it occurred, would be in addition to the changes identified in table 3-18.

In total, 40 operators and their ranching operations would be impacted with some income loss associated with stocking reductions, eliminations and periodic elimination of forage utilization.

Table 3-18 indicates the ranch size grouping of the 38 operators and their respective ranch operations for those ranches associated with revenue changes resulting from forage use reductions. To estimate the income impacts associated with these forage losses, the qualifications were calculated for each of these ranches. The proposed use was subtracted from the present use to determine changes that would occur in BLM forage use. Since private lands within the allotments are also subject to conditions of the overall intensive management programs, there would also be an impact on private forage utilization within the allotments. This impact was determined and added to the change in BLM forage to determine the total impact on forage utilization and, consequently, herd size which determines revenue(income) generation for the 38 ranches. The economic impacts on ranching operations resulting from the forage use reductions were determined by using the modeling and linear analysis explained in appendix 12.

Table 3-18 indicates gross and net revenue changes resulting from the forage use reductions. These are changes from the estimated present levels displayed in table 2-19. Estimated revenue changes are displayed for each ranch size and type and aggregated to identify the total change.

Gross revenue would be reduced by an estimated $712,353, which when applied to the business activity multiplier of 1.8, indicates that sales by other sectors of the ES area economy would be reduced by $569,882.

Net revenue, which is direct income to the ranching families, would be reduced by $284,141.

TABLE 3-18

RANCH SIZE AND INCOME EFFECTS

Model	Cattle	Sheep	Number of Ranches	Total BLM AUM Reduction	Total Corresponding Private Land AUM Reduction	Total BLM plus Private AUM Reduction	Average AUM Reduction per Ranch	Gross Revenue Changes per Ranch	Gross Revenue Changes/All Ranches	Net Revenue Changes per Ranch	Net Revenue Changes/All Ranches
I	0 to 249		10	1,500	40	1,540	154	$- 9,060	$- 90,600	$- 2,381	$- 23,810
II	250 to 549		10	1,664	114	1,778	178	- 7,908	- 79,080	- 3,157	- 31,570
III	550 to 749		2	5,136	634	5,770	2,885	-174,265	-349,488	- 68,703	-137,406
IV	750 or greater		8	2,565	240	2,805	351	- 22,212	-177,698	- 8,326	- 66,608
V	0 to 220	0 to 1000	3	390	181	591	190	- 5,178	- 15,534	- 8,151	- 24,453
VI	221 to 1300	650 to 5400	4	679	29	708	177	+ 11	+ 44	+ 204	+ 816
VII		500 to 1249	0	0	0	0	0	0	0	0	0
VIII		1250 or greater	2	749	0	749	375	0	0	- 555	- 1,110
Total			38	12,683	1,238	13,921			$-712,353		$-284,141

SOURCE: BLM Range Automated Data System, 1978, for ranch sizing.

NOTE: Income effects derived from analysis in appendix 12. Gross and Net revenue effects have been adjusted to compensate for the non fee payment on private AUMs. Private AUMs within allotments have been included in the ranch income analysis since their level of use changes proportionally with BLM AUMs.

Applying the income multiplier of 1.6 to this amount indicates that an additional $170,484 reduction in indirect income would occur in the ES area. Thus, the total direct plus indirect income short term effect would be an estimated $454,625 reduction which is 0.125 percent of the 1976 Mesa County personal income.

The estimated net revenue changes would place a total of 15 out of the 38 ranching operations in the category of negative net revenues. Ten out of the fifteen were already in that category before the reductions.

Table 3-19 identifies the relative dependency on BLM forage for the 40 (including the 2 with elimination every 3rd year not included in the 38 in table 3-18) ranches and table 3-20 translates that relative dependency, along with alternative forage sources and season of use, into an estimate of the criticality of ranch dependency on BLM grazing.

It is interesting to note that 36.2 percent of the total of 138 ranches associated with BLM grazing in chapter 2 had criticality of ranch dependency estimated as "high". This percentage figure has increased to 55 percent for the 40 ranches associated with the reductions and/or eliminations.

Also, the number of families with ranching estimated as a primary source of income has increased from 55 percent of the 142 families discussed in chapter 2 to 69 percent (29 families) of the 42 families associated with the reductions.

Thus, it appears that the subset of ES area operators associated with the reductions are more critically dependent on BLM grazing from the standpoint of viability of their operations as well as their source of income.

Many factors influence the ability of a ranching operation to survive income losses, such as debt burden, level of capitalization, present net income (from ranching operations as well as from other sources), diversification of operation, operator's age, scale of operation, and availability of and proximity to alternative forage sources.

Lack of information on individual operators as well as the wide range of decision options available to them makes it impossible to determine whether the reduction-related income losses would force operators out of the livestock business. However, there is a strong possibility that some of the impacted operations could cease, with some recombining of properties occurring.

The impacts described above are short-term impacts which may or may not also be long-term for some of the 40 ranches involved depending upon whether or not the particular ranches regain the forage losses.

As indicated in the livestock grazing section, it is predicted that 11,328 AUMs of forage would be available for livestock use by the year 2000. It is not possible at present to determine which of the ES area operators would be allowed to use this additional forage since that would have to be determined through the land use plan (MFP) when the actual increase in additional forage is achieved. However, first consideration on use of additional forage would be given to those operators receiving reductions as a result of the proposed action. Thus, it is possible that by the year 2000, at the end of the analysis period, BLM forage use could be approximately 93,467 AUMs.

Even though identification problems make it impossible to estimate the level of BLM forage use for individual ES area ranches by the year 2000, it is possible to make an estimate of gross and net by the year 2000. This can be done by prorating the aggregate levels derived from the analysis in appendix 12 for a 100 percent reduction of BLM forage use to the possible use level by the year 2000.

The use level in the year 2000 would be a reduction of 1,355 BLM AUMs from the present level with an estimated associated reduction in private AUMs of 379 for a total forage use reduction of 1,734 AUMs. The estimated gross and net revenue reductions below present levels resulting from this decreased level of forage use would be $87,134 and $41,080 respectively.

Since gross revenue would be reduced by $87,134, sales in other sectors of the ES area economy would be reduced by $69,707 as indicated by the business activity multiplier of 1.8.

The reduction of $41,073 in net revenue, which is direct income to ranching families, would result in an additional reduction of $24,648 in indirect income in the ES area as indicated by the income multipler of 1.6. Thus, the total direct plus indirect income reduction over present levels would be $65,728.

While the long term situation does not present a significant change from present forage use levels, the short term income reductions for some impacted ranching operations could, as indicated above in this section, result in some operations ceasing and some recombining of properties occurring.

Implementation of the proposal would yield the improvements and costs shown in table 3-21. As this table shows, construction costs over the implementation period would be $944,830 in 1977 dollars.

If an estimated 20 percent of total construction cost is retained by ES area households, the income over the implementation period would be $188,966. The annual income impacts would be the amounts shown on the bottom line of table 3-21.

Although small when compared to the 1976 Mesa County Contract construction-related income of $26,897,000, these annual impacts would occur

TABLE 3-19

OPERATOR/RANCH DEPENDENCY ON BLM GRAZING

Dependency (%)	Number of Ranches
0 to 10	11
11 to 20	9
21 to 30	11
31 to 40	4
41 to 50	2
51 to 60	1
61 to 70	0
71 to 80	0
81 to 90	1
91 to 100	1
Total	40

TABLE 3-20

CRITICALITY OF OPERATOR/RANCH DEPENDENCY ON BLM GRAZING

Criticality	No. of Ranches	Percent of Total
High	22	55
Medium	12	30
Low	6	15
Total	40	100

NOTE: High means that BLM forage use is judged to be an essential element for the survival of the ranching operation. Medium means that BLM forage use may or may not be an essential survival element. Low means that BLM forage use is judged to not be essential to the ranching operation survival.

A judgmental estimate of the criticality of rancher dependency on public land grazing was made by BLM personnel by applying the following three criteria to each ranch operation:

1. Proportion of forage acquired on public land.
2. Season that forage is acquired.
3. Ease in acquiring alternate sources of forage.

TABLE 3-21

ESTIMATED CONSTRUCTION AND MAINTENANCE COSTS OF RANGE IMPROVEMENTS

Vegetation Manipulations and Range Facilities	Units	No. of Improvements and Estimated Construction Costs by Year of Occurrence[1]																			
		Year 1 No.	Year 1 Dollars	Year 2 No.	Year 2 Dollars	Year 3 No.	Year 3 Dollars	Year 4 No.	Year 4 Dollars	Year 5 No.	Year 5 Dollars	Year 6 No.	Year 6 Dollars	Year 7 No.	Year 7 Dollars	Year 8 No.	Year 8 Dollars	Total No.	All Years Dollars	Maintenance Rate (% of Initial cost)	Total Annual Maintenance Costs [1]
Vegetation Manipulation																					
Chain & Seed	Ac.			2,000	76,000											480	16,296	2,480	92,296	2	1,846
Brush Beating	Ac.													1,400	11,740			1,400	11,740	2	235
P-J Thinning	Ac.							80	6,400			500	5,000	1,900	19,000			2,480	30,400	2	608
Burning	Ac.									1,000	8,000							1,000	8,000	2	160
Water Developments																					
Reservoirs	No.	3	3,440	5	11,436			1	2,100	8	16,060	11	4,892	2	5,600	16	19,054	46	62,582	3	1,877
Catchments	No.							2	45,600	2	61,000			2	23,000			6	129,600	2.5	3,240
Spring Developments	No.	1	1,500			1	1,500	2	3,200	5	10,888	4	6,300	12	19,340	5	10,434	30	53,074	4	2,123
Wells	No.															1	9,000	1	9,000	3.5	315
Pipelines	Mi.							1.8	5,400	30.6	91,800	12.3	35,750	9.9	30,600	12.3	36,900	66.9	200,450	2.5	5,011
Other Projects																					
Fences	Mi.	15.8	47,400	2.35	7,050	6.1	18,300	1.85	5,550	19.8	59,400	24.75	74,250	12.6	37,800	20.4	67,800	103.65	317,550	2.5	7,939
Cattleguards	No.	2	4,000			1	1,800	2	4,400	3	6,400	3	5,878			1	2,000	12	24,478	2.5	612
Roads/Trails	Mi.	1.0	320					0.6	640					6.5	4,700			8.1	5,660	2	113
Totals			56,660		94,486		21,600		73,290		253,460		132,070		151,780		161,484		944,830		24,079
Income Effects on Local Households[2]			11,332		18,897		4,320		14,658		50,692		26,414		30,356		32,297		188,966		7,224

NOTE: Eight AMPs (Gibbler, Wagon Park, Big Salt, E. Toms Cyn., Corcoran Wash, Mt. Garfield, East Salt, and Winter Flats) with projects to be constructed are presently being implemented. Many of the projects on these eight allotments will be constructed in Fiscal Years 1979 and 1980, depending upon funds available and priority decisions made by the Grazing Advisory Board. It is not known how many projects will remain to be constructed when implementation of the proposed action begins or how long it will take to finish construction. Any construction of remaining projects during the eight years outlined for implementation of the proposed action would slightly alter ES area income and employment projections made in this chapter for the contract construction and government sectors. All monetary calculations on this table were rounded to the nearest dollar.

[1] Construction of range improvements would be completed by the end of the eighth year after implementation of the proposed action.

[2] Estimated at 20 percent of initial construction costs and 30 percent of maintenance costs.

in an area where incomes are below state levels. The actual magnitude and significance of these impacts is dependent upon the number of contractors and the size of the labor force employed from the ES area.

Annual expenditures for maintenance would represent an ongoing impact in the area. Table 3-21 summarizes by improvement type the maintenance impacts, which are based on maintenance rates estimated as a percentage of initial costs. Upon completion of the proposed improvements, annual maintenance costs would be $24,079. Since maintenance is more labor intensive than construction, it is assumed that 30 percent of maintenance costs would be retained by area households as income. Thus, the relatively insignificant annual income effect would be $7,224.

Maintenance costs have both positive and negative aspects. On the positive side, the increased income, although minimal, would be welcome. However, some of the actual annual maintenance would be assumed by ranch operators (e.g., fences and springs, $10,062) as a condition of AMP implementation.

Thus, it appears that some of the beneficial income impacts on construction workers, ranch hands, etc., could come at the expense of livestock operators.

In chapter 2 it was indicated that hunting and fishing expenditures in the ES area possibly accounted for about $4.5 million of income in 1973. The Wildlife section in this chapter indicated that the proposal would provide habitat for expanding big game populations, particularly deer.

The recreation section of this chapter indicated that this increased big game population would create increased hunting and viewing opportunities. This additional human-related wildlife use would create additional income for ES area households.

Although it is not possible to calculate the exact magnitude of this positive income impact, it is expected to be minimal.

Implementation of the proposed action would require hiring additional BLM employees who would be involved with survey, design, contract supervision, maintenance, and range supervision during the eight year implementation period and range supervision and maintenance after implementation. Salary payments through the eight year implementation period would be an estimated $1,901,030 total for a yearly average of $237,629. Salary payments after implementation would be an estimated $163,482 per year. Net salaries would be less than the amounts indicated; however, the multiplier effect would increase local impacts on area personal income to about the level of the gross salaries indicated.

Overhead expenditures would account for an estimated $12,627 in area personal income annually during implementation and $7,500 annually thereafter.

Impacts on Employment

As indicated in the preceding section, government employment would be increased. There would be a total of 160 person-years of employment generated during the eight-year implementation phase and 12.75 person-years of employment annually thereafter. Overhead expenditures would account for about eight person-years of employment during the eight-year implementation phase (assumes an average annual salary of $12,000) and about .63 person-years of employment annually after implementation.

During the eight-year implementation phase, 15.75 person-years of construction employment would be generated. After full implementation of all AMPs, the maintenance income impact would account for an estimated .60 person-years of employment annually.

The wildlife income impact due to sportsmen and other users is expected to generate a minimal amount of employment. Due to the difficulties of identification and quantification, the exact magnitude of this impact is unknown.

There would be an estimated 10.52 man years of hired employment decrease on ES area ranches in the short term resulting from ranching cutbacks due to lower levels of BLM forage use (appendix 12). It is possible that the long term reduction would be a decrease of about 1.28 man years hired employment by the year 2000.

After implementation of the proposal, the total long term permanent employment impact is estimated to amount to a net gain of about 12.60 person years annually. Although the overall impact is positive, it is insignificant when compared to the estimated Mesa County employment (May 1978) of 30,575.

Impacts on Public Finance and Tax Base

As indicated in a previous section, there would be a decrease in allowable AUMs (active use qualifications) from the presently licensed level of 94,822 to 82,139. The decrease of 12,683 AUMs allowable use would represent economic value to the 40 ranches associated with the use decreases. Therefore, the relative value of such ranches and of the ES area tax base would be decreased in the short term.

Various appraisal estimates suggest that the value of livestock ranches in western Colorado is about $1,000 to $1,200 per animal unit of carrying capacity (one animal unit equals 12 AUMS). A decrease of 12,683 AUMs would translate into a decrease of

1,054.92 animal units of allowable use, which would decrease the present value of the affected ranches by about $1,054,920. This decrease, although possibly only a paper loss, would be felt by the ranch owners.

A related decrease would involve the tax base. In Colorado, property can be assessed at 30 percent of its market value. In recent years the trend has been to assess agricultural lands at levels below the upper limit as these lands have appreciated so rapidly. It is possible that changes in ranch value would now be assessed at about five percent of market value. This would mean that decreased ranch values resulting from cuts in allowable use would result in a decrease in the tax base of about $52,746, or 0.025 percent of 1977 Mesa County assessed valuation (Colorado Department of Local Affairs 1977).

In the long term by the year 2000, allowable use could be up to 93,467 AUMs which would mean a much smaller decrease from present levels in carrying capacity of ES area ranches. The decrease of 1,355 AUMs would translate into 112.92 animal units which would decrease the present value of ES area ranches by about $112,920. A related reduction in the tax base would be about $5,646 which would not be significant when compared to the 1977 Mesa County assessed valuation.

It should be noted that Colorado agricultural land prices reflect demand influences for land which involve considerations other than future ranch income. Therefore, the likelihood that ES area ranch property would appreciate is acknowledged. However, values of ranch property with decreased present value as a result of the proposal might be expected to increase at a slower rate than similar properties experiencing no decrease in allowable use.

Property taxes paid to local governments would decrease by an estimated $4,368 in the short term as a result of herd reductions on impacted ranches (appendix 12).

The long term decrease in loacl taxes paid in the year 2000 would be an estimated $533.

Impacts on Social Well-Being

In the short term (at the very least), the social well-being of the 42 families associated with the income losses would be adversely impacted. This adverse impact resulting from income loss would affect an estimated 155 people. It is possible that the forage and subsequent income loss would be regained, depending upon future allocative decisions coming out of the BLM planning system. However, the possibility does exist that the forage would not be regained by all impacted ranches. Consequently, the income loss could be long-term for some individuals.

Some of these 42 families could also be adversely impacted if they were not able to remain in the range livestock business due to inability to sustain the forage losses, since the dependency on BLM forage of some ranches associated with these families is relatively critical. Some of these individuals could be adversely impacted as a result of the social and occupational dislocation which could result from the inability to survive the forage use reductions.

Impacts on Social and Cultural Attitudes

The BLM forage use reductions could conflict with aspirations held by the ranching community, since it would diminish the relative importance of what many in livestock ranching consider to be a justified and important land use. Those directly impacted by reductions could feel themselves deprived of opportunities to pursue what they consider to be a hard-working, independent existence.

Those livestock ranchers without reductions or periodic eliminations in their intensive management allotments could be expected to concur with the proposal, since it would enhance their use of public lands by providing what many of them consider to be needed range improvements.

Conclusion

The total direct plus indirect short term and long term range livestock related income impacts on the ES area economy would be estimated annual reductions of $454,625 and $65,728 respectively. Contract construction related income would increase by a total of $188,966 through the eight year implementation period and by an estimated $7,224 annually therafter. Recreation related income would increase by a small indeterminate amount. Government related income would increase by an estimated yearly average of $250,256 during the eight year implementation period and $170,982 annually thereafter.

Hired ranch employment would decrease by an estimated 10.52 person years annually in the short run and by 1.28 person years in the long run. A total of 15.75 person years of construction employment would be generated through the eight year implementation period with .60 person years of employment generated annually thereafter. Recreation related employment could be increased by a small indeterminate amount. Government related employment would be increased by a total of 168 person years through the eight year implementation period and by 13.38 person years annually thereafter.

Local property taxes paid would decrease by $4,368 annually in the short term and by $533 in the long term.

The social well-being of 42 ranching families would be adversely impacted due to income losses. If some of these families could not remain in the livestock business due to inability to sustain forage losses, they would also suffer social and occupational dislocations.

The forage reductions could conflict with aspirations held by the ranching community, depriving some operators of opportunities to pursue what they consider to be a hard-working, independent existence. However, the implementation of needed range improvements and increased forage production would be well received by operators, particularly by those not impacted by forage reductions.

Impact on Visual Resources

When the proposed action would remove vegetation, disturb the soil, or place a structure on the landscape, a visual impact would occur. The degree to which the impact would affect the visual quality would depend upon the amount of visual contrast that is created between the activity and the existing landscape.

The VRM classes discussed in Chapter 2 and BLM Visual Resource Contrast Ratings Manual 6320 were used to provide a basis for measuring impacts of the proposed action on the visual resource (see appendix 5 for a detailed explanation of the methodologies used). Each of the range improvements was analyzed to determine how much it would contrast with the form, line, color, and texture of the existing landform, vegetation patterns, and structure. A contrast rating was then assigned.

Several factors influence the amount of contrast detected. These include the distance of the viewer from the modification, the lighting, and the length of time in view.

Impacts on visual resources from any action depends on the VRM class in which the action occurs. Three types of features are considered: land surface, vegetation, and structure. Modifications to class II landscapes that are visually evident, i.e., exceeding a contrast rating of 2 for any one landscape element (form, line, color, or texture) or a rating of 10 for any feature, would create a discordant impact. Modifications may be evident in class III landscapes but should remain subordinate. To avoid discordant impacts to class III, the total contrast rating for any feature should not exceed 16 (appendix 5).

Table 3-22 shows the contrast ratings by element and feature for vegetation manipulation, range facility projects, and grazing systems. The contrast ratings are typical or probable ratings. When the proposal is implemented, the ratings may be slightly different, e.g., a reservoir may have a lower or higher score depending on screening, viewing distance, or some other characteristic.

Vegetation manipulation and roads and trails would not meet the allowable visual impact criteria in class II areas and the foreground of class III areas. Thinnings, water catchments, wells, and the grazing systems would not meet the allowable visual impacts of VRM class II lands. In the case of grazing systems, the visual benefits of increased green cover would outweigh the contrasts visible along pasture boundaries.

Table 3-23 shows whether the specific components of the proposed action are within the allowable visual contrast ratings or whether they exceed the allowable contrast limits and are discordant. Table 3-24 depicts in which specific allotments the discordant components of the proposal are located.

There would be no significant difference between the three AMP grazing systems in terms of visual impacts. They are therefore discussed as a group.

Dividing allotments into separate pastures would result in the development of contrast between adjacent pastures. As pastures were grazed, a line of changes in color and texture would form as the density, species composition, and amount of forage changed through the grazing cycle. The most obvious contrasts would develop between rested and grazed pastures, with the contrast most evident at the end of the grazing season.

In some allotments, the proposed action includes the grazing of more AUMs in certain pastures than are being grazed presently. This could result in reduction of both plant size and density. Where such conditions occurred, the contrast resulting from the more heavily utilized vegetation would be evident between grazed and rested pastures.

There would be changes in color of pastures as the proposed AMPs brought about increased plant density and changes in species composition. Impacts would vary, depending on the location of the grazing unit in the overall landscape, i.e., the bare soil coloration that has resulted from many years of weathering may be altered by vegetative growth introduced by the proposed action.

Impacts from pasture contrast would be most evident directly along fences dividing the pastures. By the end of the twenty-year period following implementation, contrasts may be lessened as vegetation conditions equalize within the pastures in each allotment.

The vegetation feature would not meet the quality class objectives for VRM class II areas. However, a change which creates contrast with a present vegetation feature would be beneficial where an increase in vegetation occurred.

The 88 less intensive management and 2 elimination of grazing allotments would undergo no visual

TABLE 3-22

CONTRAST RATINGS FOR PROPOSED PROJECTS

	Projects									
Elements[1]	Grazing Systems	Vegetation Manipulation[2]	Thinning	Reservoirs	Water Catchments	Spring Developments	Wells	Pipelines	Fences	Roads & Trails
Land Surface Features										
Form (X4)[2]	--	1	--	1	1	1	1	1	--	1
Line (X3)	--	--	--	1	1	1	1	1	--	3
Color (X2)	--	1	--	1	1	1	1	1	--	2
Texture (X1)	--	1	--	1	1	1	1	1	--	2
Total	0	7	(0)	10	10	10	10	10	0	19
Vegetation Features										
Form (X4)	1	2	(2)	1	1	1	1	1	--	1
Line (X3)	2	2	1	1	1	1	1	1	2	3
Color (X2)	1	2	1	1	1	1	1	1	--	--
Texture (X1)	1	2	(2)	1	1	1	1	1	--	1
Total	13	18	(15)	10	10	10	10	10	6	14
Structure Features										
Form (X4)	--	--	--	--	2	1	2	--	1	--
Line (X3)	--	--	--	--	1	1	1	--	1	--
Color (X2)	--	--	--	--	2	1	1	--	--	--
Texture (X1)	--	--	--	--	1	1	1	--	--	--
Total	0	0	(0)	0	16	10	14	0	7	0

NOTE: Ratings describe long-term impacts; visual distance is foreground.

1/ Each element is weighted according to its significance.
2/ Excluding thinning.

TABLE 3-22 (Continued)

CONTRAST RATINGS FOR PROPOSED PROJECTS

	Projects									
Elements[1]	Grazing Systems	Vegetation Manipulation[2]	Thinning	Reservoirs	Water Catchments	Spring Developments	Wells	Pipelines	Fences	Roads & Trails

Degree of Contrast per Element

strong = 3
moderate = 2
weak = 1
none = 0

Feature Score - Impact

1-10 = seen
11-20 = attracts attention
21-30 = demands attention

TABLE 3-23

VISUAL IMPACT SUMMARY

PROJECTS	VRM CLASS			
	II	III		IV
		Foreground	Middleground Background	
AMP (Intensive) Grazing Systems	X[2/]	0[3/]	0	0
Vegetation Manipulation[1/]	X	X	0	0
Thinning	X	0	0	0
Reservoirs	0	0	0	0
Water Catchments	X	0	0	0
Spring Developments	0	0	0	0
Wells	X	0	0	0
Pipelines	0	0	0	0
Fences	0	0	0	0
Roads & Trails	X	X	0	0

1/ Excluding thinning.

2/ X = discordant impact.

3/ 0 = less than discordant impact.

TABLE 3-24

PROJECTS WHICH WOULD CAUSE DISCORDANT VISUAL IMPACTS

ALLOTMENTS	VRM CLASSES	
	II	III
Deferred Rotation		
125 Aubert Brothers	2 Stock trails (1.5 miles)	-----
145 Dugway1/	Well	-----
203 Whitewater common	Chaining (2,000 acres)	-----
429 Dolores Point1/	-----	Brush beating (270 acres)
405 Wright Draw	Thinning (80 acres)	-----
Rest Rotation		
401 Palisade Flats	Stock trail (1.75 miles)	-----
723 Henderson 4A Ridge	-----	Brush beating (1,130 acres)

1/ Allotment has areas in Utah.

change. Chapter 2 describes the present environment and thus describes future conditions with the proposal on these 90 allotments.

Vegetation manipulation would occur on twelve allotments totaling 10,835 acres. The vegetation treatments would modify the basic elements of form, line, color, and texture from the time of the initial action through and beyond revegetation. The visual contrast would be most obvious immediately following treatment due to the replacement of shrubland and pinyon-juniper type with charred or dead vegetation resulting from burnings and brush beatings and because of mineral soil exposed in the chained areas. These contrasts would decrease over time as grasses, forbs, and shrubs become established. However, contrast would still be evident for as long as it took the original natural vegetation to reestablish itself.

Windrows created in the chaining projects would introduce highly visible lines. This contrast would remain into the long term.

The contrasts of the vegetation manipulation result from openings in the original vegetation, which create unnatural lines along the perimeters, and from changes in color and texture between the original vegetation and the clearings and revegetation. However, there would be discordant visual impacts (an impact exceeding the allowable contrast for each VRM class) in only three allotments: Whitewater Common Allotment (203), with 2,000 acres to be chained and seeded in VRM class II; Henderson/4-A Ridge Allotments (723), with brush beating on 1,130 acres in VRM class III; and Wright Draw Allotment (405), with an 80-acre thinning proposed in a VRM class II area.

The cumulative, localized impact of vegetation manipulation would be long-term and moderate. The areawide effect would be negligible.

One well in Dugway Allotment (145) would involve vegetation removal, soil disturbance, and additional water and structures on an area identified as VRM Class II. Fencing of this project would allow vegetation within to grow unchecked, while the vegetation outside would be heavily grazed as livestock concentrated around the water source. This would visually define the fenceline and result in a contrast in color and texture between vegetation inside and outside the fence.

Additional soil disturbance and vegetation removal would result from the placement of storage tanks and troughs. Pipelines would be installed between storage tanks and water sources. A temporary project road could be created during construction. The visual impact this would create is discussed under the road and trails section. Only this well in Dugway Allotment (145) would be discordant.

A total of 8.1 miles of roads and stock trails in five allotments disturbing 19.6 acres are proposed. Next to vegetation manipulation, they represent the most noticeable visual impact. Soil would be disturbed and vegetation removed over a wide corridor, creating an unnatural line on the landscape. The visual impact would not lessen over time because of continued use by livestock operators and recreationists.

Stock trails in Aubert Brothers Allotment (125) (1.5 miles) and Palisade Flats Allotment (401) (1.75 miles), both in VRM class II, would be discordant.

Conclusion

The three AMP grazing systems would result in discordant visual impacts on VRM class II areas. Two vegetation manipulation projects, one well, and three stock trails would result in discordant impacts in five allotments in VRM class II. Two brush beatings in two allotments in VRM class III would result in discordant impacts.

Impact on Recreation Resources

The overall impact of the proposed action upon recreation would be an improvement in the hunting and viewing of wildlife, increased firewood gathering and Christmas tree cutting opportunities, and better access to public lands. There would be both adverse and beneficial impacts, resulting in an overall minor impact, upon camping, picnicking, and hiking. Opportunities for solitude and for sightseeing in undisturbed areas would be diminished.

The proposed AMP grazing systems would decrease forage competition between livestock and big game as well as improve overall vegetation condition. This would have a long-term, beneficial effect on hunting opportunities due to the anticipated increase in wildlife numbers. Native upland game bird populations would also increase with improved habitat condition. Wildlife would likely concentrate in the rest pastures, resulting in improved opportunities for observation.

Some wildlife habitat would be removed immediately following vegetation manipulation. However, as the vegetation reestablished itself, better forage would be provided for wildlife. This would cause an increase in local population, which would, in turn, attract certain animals to these areas, creating increased hunting and viewing opportunities. However, it is impossible to quantify increased recreational use because a number of variables, e.g., length of season, number of permits issued, cost of licenses, and degree of public access, would affect hunting use.

As with the vegetation manipulation projects, the additional water catchments, reservoirs, and springs would attract wildlife, thus providing additional wildlife concentration areas where hunters and observers could find the animals. The water developments would also provide a focal point for camping and picnicking activities.

The fences would be an inconvenience to hunters and a hazard and barrier to snowmobilers, motorcylists, and horseback riders. The fencing of springs to exclude animals would protect the water from pollution by trampling and defecation, possibly making such sources safe for human consumption.

The 8.1 miles of roads and trails would provide improved access. This would result in more hunting opportunities and a better wildlife harvest.

The quality of fishing would be increased by implementation of the proposed action. Cattle would still use the streams and riparian vegetation as a source of water and food; however, the level of use would be lowered through distribution of cattle into currently unused areas. The resulting decrease in trampling and fecal contamination would beneficially impact fishing streams. Although fishing conditions may improve as a result, it is doubtful that fishing use would increase because of the poor access to streams, which is the major limiting factor.

The presence of livestock and range improvements to accomplish livestock distribution could conflict with people hiking and seeking solitude. Cattle concentration near heavily used recreation areas could result in annoyance due to animal defecation odors. The absence of livestock in the rest pastures during the recreation season would result in less physical disturbance to recreation users and eliminate the presence of odors associated with grazing animals.

An increase in vegetation would improve sightseeing opportunities. The opportunity to view or not view livestock, depending upon one's preference, would be enhanced through the concentration of livestock on one-third or less of any season's range at any given time.

Camping, picnicking, hiking, sightseeing, and vehicle play in these areas would decrease (except for observing and hunting of wildlife or collecting of firewood and Christmas trees) due to the visual disturbance and alteration of the natural setting. Brush beating would be the one exception; one of the areas scheduled for this treatment is so densely covered with brush that no hiking or camping is possible now. Removal of this brush would open up the area for recreational use.

The chaining of pinyon and juniper trees would provide an excellent opportunity for firewood collecting. Several years following the chainings, Christmas tree cutting opportunities would exist as the pinyon trees reestablished themselves. It is assumed BLM would continue to allow wood collecting and Christmas tree cutting as it does at present.

The 8.1 miles of roads and trails would provide improved access for four-wheel vehicles, motorcyles, hikers, horseback riders, and cross-country skiers. It would also open up areas for collecting, sightseeing, and other various activities. However, improved vehicular access would destroy some of the solitude one could experience in these areas. The impact the range projects would have upon the visual resource would also affect the sightseeing quality, which is analyzed in the Visual Resources section of this chapter.

Conclusion

The predicted improvement in range condition and forage production recounted in the vegetation section would result in the wildlife increases and positive visual benefits predicted earlier in this chapter. These changes would improve the viewing and recreational harvest of natural resources, which includes hunting.

However, the range improvements would hinder travel and detract from the sense of solitude. Perception of this adverse impact by recreationists probably would exceed that of the beneficial impact.

Recreation on the 88 less intensively managed allotments and two elimination of grazing areas would not change.

Impact on Wildland Areas

Through the BLM planning system, seventeen management guidelines were determined for six wildland study areas. These guidelines prohibit all construction in wildland areas except for water storage projects which do not alter wildland values. Spring developments are the only type of water storage project which meets the above criterion. A total of fourteen reservoirs, one well, 3.4 miles of pipeline, 10.7 miles of fence, 4.0 miles of stock trails (3.5 maintenance and .5 construction) and 80 acres of pinyon-juniper thinning are proposed within four of the wildland study areas. These range projects could require upgrading of existing roads and construction of temporary roads for access during construction.

While any potential wilderness portions of these areas would not be impacted (see chapter 1 for procedures to be used in potential wilderness areas prior to the completion of wilderness inventories), nonwilderness portions would be. The natural qualities of the wildland areas would be degraded and opportunities for hiking and experiencing solitude would be diminished.

The conflict between the wildland area guidelines and the proposed action would have to be resolved by the District Manager prior to implementation.

Impact on Wilderness Areas

Although the potential for establishing wilderness areas in the ES area is not presently known, impacts listed here would result if the proposed action was implemented in an area with wilderness potential. Impacts to potential wilderness would result from the construction of fences, access roads, and water developments. Impacts would be in the form of scars on the landscape due to construction activities. Visual impacts would result from the appearance of manmade features that would change the wilderness character of the area. These impacts would occur in the short term, but would be of long-term duration. However, if any area within the ES area was identified as having wilderness potential and was formally identified as a wilderness study area, implementation of any part of the proposed action in that area which would change its wilderness character would be deferred. If such an area was established as a wilderness area, the deferment would be permanent; if not, the proposed action would ultimately be completely implemented.

Impact on Air Quality

Implementation of the deferred rotation, rest rotation, and best pasture grazing systems would result in increased ground cover, which would lessen wind erosion and cause a long-term decrease in suspended dust particles over the entire ES area. However, this same increased cover could increase the rate of spread of wildfires, which currently occur at the rate of 50 per year, which would increase smoke. Air quality would remain essentially unchanged over the 88 less intensive management and 2 elimination of grazing allotments. The prescribed burning of 1,000 acres would cause a localized increase in suspended dust for the one or two years required for revegetation to begin to occur and would create an increase in smoke during the actual burning process. There would be a long-term, localized increase in suspended dust particles due to vehicular travel on 8 miles (20 acres) of unpaved roads and trails.

Impact on Cultrual Resources

According to the Code of Federal Regulations (36 CFR 800.9) adverse effects on cultural resource sites would occur under the following conditions:

1. Destruction or alteration of all or part of a property.
2. Isolation from or alteration of its surrounding environment.
3. Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting.
4. Neglect of a property resulting in its deterioration or destruction.

Property could be destroyed or altered by any component of the proposed action through the removal, breakage, or movement of individual artifacts or the disturbance or loss of horizontal or vertical cultural deposits. The result would be the destruction of locational, chronological, and activity pattern data, making impossible the reconstruction of the history and processes of the site's occupation.

Isolation from, or alteration of, a site's surrounding environment would result from the installation of a fence across or near the site or from the construction of range facilities that could significantly change the local environment. The greatest such impacts would result from erosion and the construction of earthen reservoirs. Such alteration or loss of environmental data would, in turn, decrease or destroy the potential for deriving paleontological information on the site's occupation.

The construction of highly visible range facilities, such as water storage tanks, rainfall catchments, and earthen reservoirs, may introduce to the cultural resource sites visual elements out of character with the property.

The fourth adverse impact--neglect of a property resulting in its deterioration or destruction--could result from any of the measures in the proposed action. Such neglect might include the failure to recognize the need for preserving a cultural resource site, resulting in its increased use by cattle or visitors, and the failure to consider all possible impacts on the cultural resources during the planning of projects and the establishing of grazing systems.

Neglect could also take the form of exposing a site to future (indirect) impacts by the removal of the vegetation and soil covering a site or its watershed. Such vegetation and soil removal could result from construction or overgrazing and would result in increased erosion, increased damage from trampling, and increased visibility of the site to vandals. New or improved access into an area could increase vistor use and vandalism and the numerous adverse impacts that accompany them.

BLM would follow procedures mandated by Federal laws, i.e., PL 93-291, Antiquities Act of 1906, National Historic Preservation Act of 1966 PL 85-665, Executive Order 11593, the National Environmental Policy Act of 1969, PL 85-665, federal regulations, and U.S. Department of the Interior policy concerning cultural resources properties under its jurisdiction. Procedures and authority are outlined in 36 CFR 800.1 through 800.10. See appendix 6 for further information on compliance procedures.

Impacts on Archeological Resources

The high density-low frequency grazing associated with the three AMP grazing systems would result in livestock creating new and wider paths, especially along fences. This would disturb lithic scatters to a greater degree than current grazing practices and grazing systems proposed for the 88 less intensive management allotments, which are resulting in livestock cutting deeper, but narrower, trails. (Under longer use, animals tend to establish routes and deviate infrequently.) Timing could affect the degree of damage caused by trampling. Many AMPs shift grazing to fall and winter, resulting in less trampling damage because the ground is frozen.

High density-low frequency grazing, combined with timing to encourage the growth of desirable plant species, should result in decreased soil erosion, thereby decreasing the rate of decay or destruction of archeological resources.

The two elimination of grazing allotments would be beneficially impacted because of the complete absence of livestock. The increased human presence required to operate the grazing schedules would heighten the risk of vandalism.

Trampling could cause soil compaction, reduce plant cover, and create trails which contribute to erosion (Litzinger 1975). Erosion can impact archeological resources. In addition, trampling could break and scatter surface archeological sites.

Standing structures, such as masonry walls, dry laid walls, or wikiups, could be damaged or destroyed by rubbing. While trampling and rubbing occur under the present grazing system and would occur on less intensive management allotments, the three AMP grazing systems would put livestock on pastures which have traditionally received little use, resulting in damage to many additional areas. This would constitute a long-term, major impact.

The redistribution of livestock would reduce trampling and rubbing on currently overgrazed areas. This could result in a long-term, beneficial impact.

The two elimination of grazing areas would sustain no further trampling or rubbing damage. These would therefore be beneficially impacted by the proposal.

Chaining 3,925 acres could destroy an estimated 49 archeological sites. Types of sites subject to destruction by chaining include large cultural resources such as walls, wikiups, pottery, and cists. In addition, the effects of chaining upon lithic scatters have been analyzed and found to be detrimental (Wiley, Green, DeBloom 1974). Both horizontal and vertical movement of lithic scatter components was observed. The chaining resulted in loss and damage to the elements of the lithic scatter. This loss, in turn, affected the quality and quantity of site components available for analysis.

The seeding of the two allotments could create a beneficial impact to archeological resources. Unstable soil could be stabilized by seeding, which would deter erosion.

The felling of large trees, during the thinning project, on 2,480 acres in Spears (703) and Round Mountain Allotments (745) could damage wikiups and other standing structures. This impact would be long-term and major.

Burning 1,000 acres on Bull Hill-Maverick Common Allotment (407) could have a direct impact on an estimated twelve to thirteen archeological sites. Standing structures, such as wikiups, could be completely destroyed by fire and lithics could be damaged by heat. Modern carbon contamination can damage the dating process of archeological resources.

The construction of 58 reservoirs and six water catchments could directly impact surface and subsurface archeological sites. It is estimated that one site would actually be impacted.

Some springs were intensely utilized by prehistoric peoples. These springs are considered to be a cultural resource in themselves as they contain quantities of artifacts and represent intensive occupation. The development of 34 springs and construction of four wells and 138 miles of pipeline would impact sites AR05-07-412, AR05-07-12, AR05-07-599, AR05-07-619, AR05-07-175, AR05-07-275, and AR05-07-826.

Fences and cattleguards would impact archeological sites AR05-07-609, AR05-07-617, and AR05-07-837, in two ways:

1. The actual construction could cause horizontal and vertical movement of site components. The construction activity could result in damage or loss to the archeological site and or its components.
2. Fences would enclose livestock, allowing repeated utilization of delineated areas. This use would cause trails which could impact surface as well as subsurface archeological sites.

The disturbance of 19.6 acres in the construction of 8.1 miles of roads and trails could directly impact any surface and subsurface archeological sites. In addition, the maintained exposed surface would continue to be a source of sediment debris to any downslope archeological site.

Conclusion

The proposed vegetation manipulations and range facilities would involve the disturbance of 11,267 acres. Based upon previous surveys in the Grand Junction District, it is estimated that 141 archeological sites would occur on these areas. The proposed grazing systems could result in impacts to the 451 known archeological sites in the ES area.

Table 3-25 shows the site-specific information on impacts involving ten sites. It should be noted that four of these are considered eligible for inclusion on the National Register of Historic Places.

Any impact could destroy finite cultural and environmental evidence pertaining to prehistoric occupation and use of the ES area by humans. Reduced erosion, an ultimate objective of the proposed action, could assist the survival of sites of cultural record.

Impacts on Paleontological Resources

In general, paleontological resources would not be significantly impacted by implementation of the proposed action; however, there could be some unavoidable destruction of paleontological sites. The discovery of new fossil bone deposit sites in the area during construction of range facilities would constitute valuable paleontological knowledge to the scientific community.

The probability of disturbing bone deposits cannot be predicted with present data.

Impacts on Historical Resources

Rubbing against standing structures, particularly by cattle, is a significant source of impact to historical sites. A cabin can be destroyed over a period of several years (figures 3-9 and 3-10).

Livestock rubbing would impact Barrel Spring cabin (HS-05-07-58) in East Salt Allotment (602). The proposal does not call for stocking reductions in this allotment, so rubbing would continue at its present rate. The possible impacts of the five-pasture, rest rotation grazing system are not known.

While most objects of historic value are found on the surface, those buried could easily be destroyed before discovery. For this reason, reservoirs, water catchments, and pipelines would create the potential for major impacts. The following sites on Sinbad Valley Common Allotment (409)would be impacted or marginally affected by the implementation of the proposed action: HS-05-07-12 by construction of one reservoir and HS-05-07-17 by the construction of 2 miles of pipeline.

The construction of the pipeline and reservoir would cause earth disturbance on or near the sites and could produce a visual or audible impact (36 CFR 800.9).

The possibility exists for discovering a historical resource during excavation without damaging that resource. This would be a beneficial impact.

Conclusion

Ten specific archeological sites and two historical sites would be adversely impacted by the proposed range facilities (mitigation would be undertaken). The excavation involved in installing range facilities and the physical disruption of vegetation manipulation projects would create a direct hazard to cultural material.

Overgrazing would be eliminated over the entire ES area. The overall decrease in soil erosion, as predicted in the Soil section, would help to preserve cultural sites.

TABLE 3-25

IMPACTS UPON SITE-SPECIFIC ARCHEOLOGICAL RESOURCES BY ALLOTMENT

Allotment	Cultural Resource #	Eligibility for Inclusion on The National Register[1/]	Type of Cultural Resource[1/][2/]	Type of Improvement
Colorado-Black Ridge	AR05-07-412	Maybe	Rockshelter	Water Development
Three Canyons	AR05-07-617	II	II	Stock Trail
Round Knob	AR05-07-12	II	Campsite	Pipeline
Kannah Creek	AR05-07-599	Yes	Campsite	Fence-Pipeline
Gibbler	AR05-07-837	Yes	Campsite	Road
Wagon Park Common	AR05-07-619	No	IF	Pipeline
Sinbad Valley	AR05-07-175 AR05-07-275	Yes Yes	Campsite Campsite	Retention Bar Pipeline
Big Salt	AR05-07-609	Maybe	Ute Trail	Fence
Logan Gulch	AR05-07-826	No	Lithic Scatter	Reservoir

[1/] II = Insufficient information.

[2/] IF = Isolated find.

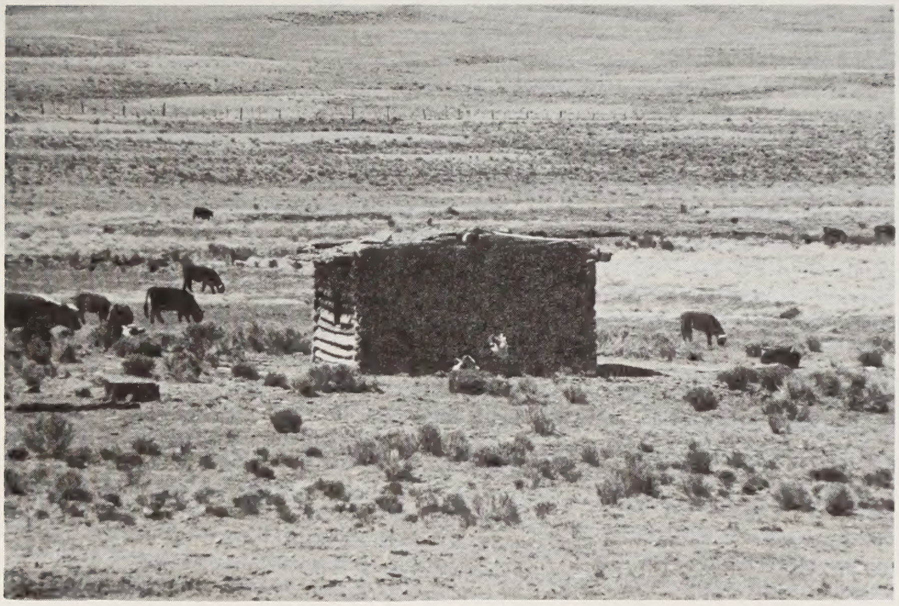


Figure 3-9. Cabin used by cattle for shade and scratching surfaces.

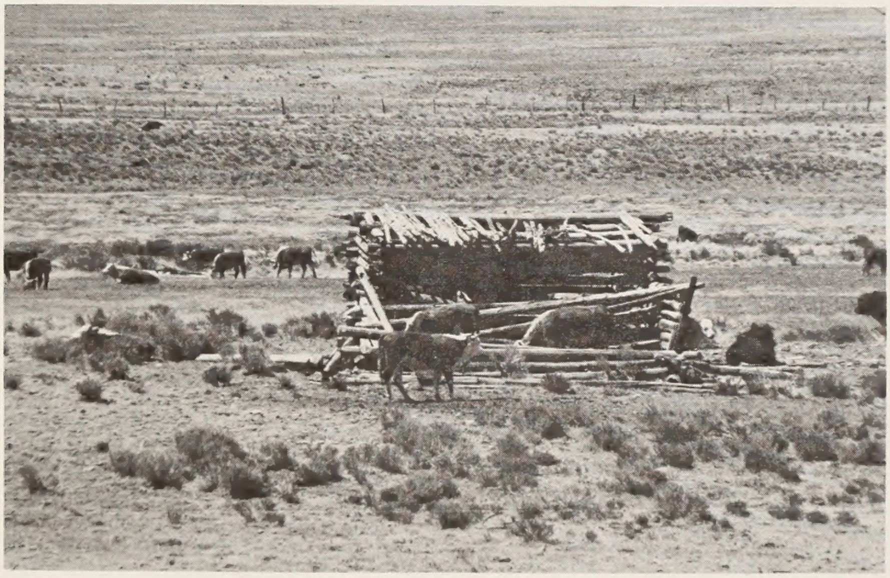


Figure 3-10. The result of frequent rubbing by cattle on a cabin.

CHAPTER 4

CHAPTER 4

MITIGATING MEASURES NOT INCLUDED IN THE PROPOSED ACTION

Measures

The Bureau of Land Management (BLM) will carry out or enforce the following measures if the proposed action were to be implemented. These measures are designed to eliminate or reduce the adverse impacts identified in Chapter 3. It is assumed that the existing and proposed improvements would be maintained as outlined in Chapter 1. Each measure is tied to an already identified impact and will be analyzed as to its effectiveness in reducing the impact. The mitigating measures are addressed by components of the proposed action over the long term and are in a numerical sequence. Following this is an analysis of the effectiveness of each mitigating measure. A tabular summary lists impacts (Chapter 3) by resource, mitigating measures (referred to by number), and the residual impact. Monitoring, research, and study programs are discussed at the end of the chapter.

Grazing Systems

1. Watershed improvement projects will be developed in selected areas to reduce salinity, erosion, and sediment yield. These projects could include reshaping and revegetation of stream banks, installation of rock gabions and check dams, and fencing of perennial streams. An Environmental Assessment Report (EAR) will be written for each project to be implemented.

Range Facilities

2. Pipelines will not be installed within any live stream channels.

3. Fence posts will not be installed within any perennial stream channels.

Proposed Action (All Components)

4. Adverse impacts to cultural and paleontological resources can be mitigated in a variety of ways. The method of mitigation would be dependent on a number of factors, including the significance of the resource and the action proposed.

Specific mitigating measures, on a site specific basis, will be developed in consultation with the Colorado State Historic Preservation Officer and the Advisory Council on Historic Preservation in accordance with 'Procedures for Protection of Historic and Cultural Properties', as codified in 36 CFR Part 800, and pursuant to Section 106 of the National Historic Preservation Act of 1966 as amended September 28, 1976 (PL 94-422) and pursuant to Executive Order 11593 (1971).

Forms of mitigation include:

1. Avoidance

   a. Through redesign of project (where possible), damage to cultural remains can be avoided. This would apply to the following historical sites: HS-05-07-12 and HS-05-07-17.

   b. Fencing of the cultural site would alleviate livestock rubbing or trampling of fragile cultural remains, thereby preventing adverse impacts. This would apply to historic site HS-05-07-58.

2. Preservation through records. For sites that would be destroyed and whose significance is in the information they contain, photographic or other records will be prepared and copies filed with appropriate agencies.

   a. Photographic records and measured drawings to Historic American Building Survey standards are required prior to demolition of a property included in or eligible for inclusion in the National Register of Historic Places (EO 11593 Sec. 2c).

   b. Surface collection of cultural remains and recording of distribution of artifacts and features may be adequate in some instances.

   c. Major excavation of an affected site according to a specified research design would be necessary when a significant site would be lost or greatly altered.

   d. A salvage excavation would be considered only as a last resort because it is generally a minimal effort.

3. Prosecution and Education

   a. Prosecution of vandals may be one way to halt some of the illegal collecting and excavating of archeological sites.

   b. Programs to educate the public about the significance and fragility of this nonrenewable resource may also help alleviate some vandalistic pressures.

Analysis of Effectiveness

1. There would be local increases in sediment yield (see table 3-10).

Mitigating measure 1 will be applied.

The watershed improvement projects would reduce salinity and sediment yield to such a degree that an overall decrease would occur despite the local increases, thus more than offsetting the adverse impact in the overall ES area. Evidence of reduced sediment and salinity as a result of watershed improvement projects in the ES area is presented in the DSC Salinity Report (USDI BLM 1978) and the Indian Wash Watershed Work Plan (Upper Grand Valley Soil Conservation District 1961).

2. Pipeline installation within live stream channels would cause increased turbidity and sedimentation during the construction process.

Mitigating measure 2 will be applied.

Not allowing pipeline installation within live stream channels would result in 100 percent mitigation.

3. Fences installed within perennial stream channels would cause debris buildups during high flows, causing adjacent bank undercutting.

Mitigating measure 3 will be applied to this impact.

Not installing fence posts in stream channels would decrease debris buildups, but no data are available to allow quantification of the degree of mitigation.

4. The institution of grazing systems, implementation of vegetation manipulation projects, construction of range improvements, and expected increases in vandalism could result in serious damage to, or destruction of, cultural resources.

Mitigating measure 4 will be applied to this impact.

Avoidance, preservation, and prosecution and education would reduce damage and destruction, but no data are available to allow quantification of the degree of mitigation for archeological resources. The fencing of HS-05-07-58 and the redesign (if necessary) of projects around HS-05-07-12 and HS-05-07-17 would result in 100 percent mitigation.

Table 4-1 presents a summary of impacts, mitigations, and residual impacts.

Monitoring Programs

Resource monitoring programs would include evaluation studies which are part of the proposed AMPs plus other specific studies involving soils, water resources, threatened and endangered plants, terrestrial wildlife, and aquatic wildlife and riparian habitat.

AMP Evaluation Procedures

Provisions are made in each AMP to determine if satisfactory progress is being made in achieving specific objectives. Since composition and density of vegetation is always involved, data would be collected for use in integrated range, watershed, and wildlife studies. Data will be analyzed for use in several basic areas of concern for AMP evaluation:

1. Actual use: data expressed in total animal unit months (AUMs) would be based on livestock numbers and periods of use. Knowledge of how many livestock actually grazed the allotment would be essential to proper evaluation. The permittees would keep records of actual livestock use on forms furnished by the BLM and would return this information on these forms to the area manager fifteen days after termination of the grazing season. BLM employees would spot check livestock on the range from time to time.

2. Utilization: the percent of plant growth removed annually by grazing animals largely determines whether the productivity of the range will be lowered, maintained, or improved and thus directly influences range trend and condition. Records of utilization covering a period of years can help answer such questions as why some ranges deteriorate and nearby ranges improve. Utilization records provide management a tool to balance stocking with forage supply and to make adjustments in distribution of livestock on the range. Approved BLM utilization studies (BLM Manual 4412.22) would be run following the grazing of each pasture during the initial cycle to insure that utilization did not exceed 60 percent of key forage species. Thereafter, utilization studies could be run once after each cycle or more frequently to determine when to move the livestock to other pastures. Frequency of additional studies would be determined by the area manager.

3. Range Trend: accurate interpretation of trend data requires sound judgment based upon knowledge of the ecology of vegetation and soils. No single vegetation or soil factor can be selected as the sole guide to trend. Several factors must be carefully considered and evaluated. Management has a significant influence on the direction of trend and on the rate of change. Photo trend plots would be established in each pasture prior to implementation of the grazing system to aid in determination of range trend. These plots would be photographed each year and read again at the end of each cycle.

4. Key Species Development Dates: the time periods of the key species development stages are variable and depend on the physiology and phenology of the individual plants. Elevational differences and local climatic conditions also cause vari-

TABLE 4-1

SUMMARY OF MITIGATING MEASURES

Impact	Mitigating Measures	Residual Impact
WATER RESOURCES		
Local increases in sediment yield	1	0
AQUATIC & RIPARIAN WILDLIFE HABITAT		
Increased turbidity and sediment in streams	2	0
Debris buildups and adjacent bank undercutting in perennial streams	3	Unknown
CULTURAL RESOURCES		
Damage to, and destruction of, archeological resources	4	Unknown
Damage to three historical sites	4	0

ance in the developmental stages. Knowledge of the above and familiarity with local conditions are used in determining beginning and ending dates of grazing seasons based on key species developmental stages.

5. Best Pasture Determination: the best pasture will be determined by considering the following factors: key species developmental stage, soil moisture, range trend, time of year, local weather conditions, other important forage growth stage, and availability of livestock water. These are the main criteria to be considered in selecting the best pasture.

Information on climate would be gathered yearly as an additional aid in determining potential success of AMPs and objectives. The basic factors to be considered would be temperature and precipitation, which are significant because of their influence over growth processes. Relatively small climatic variations from year to year result in readily observable changes in plant growth. Although these changes may be temporary, they tend to influence the judgment of the nonprofessional in relation to range condition, trend, and production. In other words, abnormally good growing conditions give the appearance of improvement in range when, in fact, it is simply greater growth of the existing species. The professional resource manager looks for more permanent indications of improving trend (apparent over a period of several years) such as seedling establishment, increased plant size, and greater seed production of desirable plants. Climatic data would be collected, and current annual data for precipitation and temperature would be compared to average or normal conditions. In addition, data on wildlife habitat utilization and trends and hydrologic response would be collected if pertinent to the resource values of the allotment.

The influential rest periods, grazing periods, utilization levels, and forage species preferences would continually need to be defined and refined. Particular attention would be given to the significance of late summer and early fall grazing on key forage species.

If the evaluation procedures determined that the specific AMP objectives established for the allotments were not being achieved, modifications of the grazing systems would be made or specific wildlife population recommendations would be made to the Colorado Division of Wildlife (DOW) to correct the adverse impacts on the habitat. Modifications (revisions) could include, but would not be limited to, changes in the grazing system, amount of use (livestock numbers), season of use, wildlife use, or any combination of these necessary to obtain the objectives. Any grazing system could be modified prior to evaluation if a deterioration in the resources on an allotment was apparent. If any modifications were needed, an environmental assessment record (EAR) would be completed prior to implementation of the revised plan.

Soils

1. Field checks of the SSF (for erosion condition) of each pasture for all allotments will be conducted after each grazing cycle. The SSF goals of each AMP will be evaluated as to their attainability. New SSF reduction goals would be chosen if necessary. If the goals were realistic but not being attained, the proposed grazing system would be modified.

2. A monitoring system will be developed for measuring soil moisture, compaction (from livestock trampling), and onsite erosion. Monitoring will be related to the effects of grazing systems, season of use, and grazing type and numbers.

3. Annual inspections will be conducted to determine if excessive damage to soils is occurring. If soil damage is excessive, adjustments to the grazing system would be made to correct the problem.

Water Resources

Studies will be initiated in selected areas to monitor various hydrologic, climatic, soil, plant cover, watershed, channel geometry, and infiltration parameters as they relate to the grazing management program. Information from these studies will be used to make recommendations for changes in the proposed grazing systems should they begin to produce adverse impacts.

Threatened and Endangered Plants (Proposed)

The life processes of all identified threatened and endangered plants will be determined. Studies would provide the data necessary to determine the presence of these plants, their responses to grazing use, their life processes, and the need for any modifications to the grazing systems. Modifications would be instituted in accordance with The Endangered Species Act of 1973 and BLM policy (Instruction Memo 77-556).

Terrestrial Wildlife

1. The Nokomis butterfly area will be fenced to allow an evaluation of the relationships between grazing impacts and the butterfly. The effects of fencing and the resulting grazing versus nongrazing will be closely monitored. Studies will be contracted to determine population status and trend of the butterfly, violet distribution and physiological requirements, and other critical requirements necessary throughout the life cycle of the species; the effects of current land uses on these factors will also be evaluated.

2. Any sudden decline in prairie dog populations or distribution will be investigated to determine the

cause and possible remedial actions. All reports of black-footed ferrets will be investigated.

If a black-footed ferret sighting is reported, visual inspections and time lapse or infrared triggered photography will be utilized to verify the presence of the animal.

3. Sage grouse habitat in the area will be inventoried and monitored to determine important strutting, nesting, and feeding areas. In addition, the feasibility of increasing occupied habitat will be evaluated. Occupied sage grouse habitat will be evaluated by pace transects or trend plots to insure that sagebrush canopy cover is not reduced below 25 percent.

4. Records of bighorn sheep utilizing public lands will be kept (Form 6610-2) to establish habitat being utilized by bighorn sheep.

5. Sagebrush and mountain shrub types will be closely monitored by utilizing data from range trend plots to insure at least 50 percent of the vegetative composition is shrubs.

6. Elk winter range will be closely monitored, recognizing that a vegetative composition of approximately 40 percent shrubs, 40 percent grass, and 20 percent forbs is optimum. Elk intermediate and summer range will be similarly monitored for an optimum value of 40 percent in forest types for hiding and thermal cover. On crucial elk winter range, utilization studies based on the ocular estimate method (BLM Manual 4412) will be conducted to insure that livestock use is limited to no more than 50 percent. Range trend plot data will be used to provide data on changes in vegetative composition (BLM Manual 4412).

Aquatic and Riparian Wildlife Habitat

All proposed range facilities affecting aquatic wildlife and riparian habitat will be monitored by the District fisheries or wildlife biologist during construction to assure a minimal disturbance of these habitats.

CHAPTER 5

CHAPTER 5

ADVERSE IMPACTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED

Introduction

Chapter 5 presents an analysis of the unavoidable adverse impacts which would result from implementation of the proposed action. These impacts consist of those remaining after application of the mitigating measures described in chapter 4 and those which could not be mitigated. Beneficial impacts are not considered here.

The organization of this chapter is similar to that of chapter 3. See the introduction to chapter 3 for details on organization and definitions of terms. It is important to read chapter 3 in order to understand the following discussion of unavoidable adverse impacts.

Vegetation

Individual pastures under the three AMP (intensive) grazing systems (particularly those grazed during spring and summer) would show a short-term decrease in plant vigor, reproduction, rate of litter accumulation, and seedling establishment immediately after high density grazing.

Vegetation manipulation on approximately 10,835 acres of pinyon-juniper and mountain shrub would result in the loss of 64,050 cords of wood production (pinyon pine and Utah juniper are assumed to have little or no forage value for livestock) and mountain shrub species, which would, in this instance, have minimal value as livestock forage due to the density of the vegetation.

Range facilities would collectively remove approximately 93 acres of vegetation for the life of the projects. This assumes revegetation percentages as given in table 3-1.

Soils

The high density grazing associated with the three AMP (intensive) grazing systems would result in short-term, adverse impacts. This grazing would increase the rate of range defoliation, increase trampling of vegetation and the soil surface, and decrease litter.

Chaining and burning would increase onsite erosion during the first year following treatment by 14,079 to 34,950 tons per year. (This range includes the least and most erodible soils found on the six affected allotments.) Erosion rates would return to original rates approximately five years after treatment. Other impacts to soils are not quantifiable due to a lack of data. These impacts include altered structure of surface soils, compaction to surface soils, loss of nutrients, decreased infiltration rates, and decreased soil moisture due to increased evaporation rates. All impacts arising from vegetation manipulation would be localized and of little significance areawide.

The construction of range facilities would initially increase onsite erosion due to a decrease in ground cover (vegetation and litter). This increase would vary from 219.2 to 413.4 tons per year during the first year following treatment. (This range includes the least and most erodible soils found in the 43 affected allotments. See appendix 8 for allotment-specific information on the rates of onsite erosion which would be expected.) The disturbed areas would recover to appproximately their original percentage of ground cover within five years.

There would be an increase in long-term, annual onsite erosion rate ranging from 38.3 to 60.8 tons per acre per year attributable to the 8.1 miles of proposed roads and trails. All impacts arising from range facilities would be insignificant areawide, since relatively small acreages would be involved.

Water Resources

There would be 1 1/2 to 5 times as much runoff, increased total dissolved solids in surface water, and 2 to 6 times as much sediment during runoff events until increased grass cover was established. These increases would occur only during runoff events and would be insignificant in terms of their effect on the total ES area.

There would be a local, short-term decrease in water quality as a result of prescribed burning. Because of the number of variables involved and a lack of data, it is not possible to quantify increases in runoff and sediment yield. Water quality would decrease during the first postfire runoff event.

Total dissolved solids would increase in the water within each reservoir. The amount of increase would depend upon a number of unpredictable climatic factors at each reservoir. Reductions of 3 to 18 percent in runoff would cause local, minor impacts. Since the 58 proposed reservoirs are only a small fraction of the total number of reservoirs in the ES area, they would have an insignificant overall impact on large streams and rivers.

The 8.1 miles of stock trails would double runoff and increase sediment yield. This would be a localized, major, long-term impact. (Increased sediment yield is quantified in the Soils section of this chapter.) Impacts from roads and trails would be insignificant areawide.

Wildlife

Terrestrial Wildlife

The general increase in wildlife populations due to rest rotation, deferred rotation, and best pasture systems would result in stress to wildlife inherent in heavy livestock use for short periods. In pastures used from mid-May through mid-July, there could be trampling of bird nests and small animal burrows and disruption of the normal process of raising young.

Pasture use later in the season, when no regrowth would occur, would not result in as severe a disruption of faunal life cycles, but would result in competition between livestock and wintering wildlife. This competition would result in increased mortality, decreased natality, and possible changes in the herds' population structures.

Most severe would be the competition resulting from wildlife and livestock grazing together on winter concentration areas. This would occur on the allotments shown in table 5-1.

Chaining, brushbeating, burning, and thinning would all result in localized decreases in forage and dislocations on a total of 10,835 acres for five years, resulting in some decreases in wildlife use. As a result of forage reduction, competition among wildlife species for forage would increase until vegetation responded as predicted in the proposed action. Sage grouse could be adversely impacted by brush beating on two allotments: Henderson/4A Ridge (723) and Kimbal (724).

Some disturbance of wildlife would be unavoidable during the construction of range facilities. Nests and burrows would likely be destroyed, along with relatively immobile animals such as rodents, reptiles, young birds, and insects. This impact would be of short duration, lasting only during the construction phase.

A total of 93 acres would be permanently lost through the presence of the projects in the area. The area lost would be insignificant in relation to the total ES area.

Big game mortality is expected as a result of the 128 miles of proposed fence, even with wildlife design considerations. Losses would probably be no more than five animals per year.

Roads and trails would increase harrassment and poaching. Improved livestock access would also increase competition between deer and cattle.

Aquatic and Riparian Wildlife Habitat

The impacts discussed below for range facilities are considered to be of local rather than regional significance.

There would be a 3 to 18 percent reduction in runoff for perennial streams normally receiving the water retained by reservoirs. This decrease in stream flow would decrease riparian and aquatic habitat for wildlife, resulting in a minor impact.

A long-term, minor to major impact on aquatic and riparian habitat is expected due to the replacement of surface flow with piping. This action could dry up sources of water for existing wet meadow vegetation.

Debris would build up around fence wire installed within stream channels during high flows, causing adjacent bank undercutting.

One thousand feet of stock trail on Palisade Flats Allotment (401) would be within or along an ephemeral stream channel, resulting in slight increases in sedimentation which could affect aquatic life in the Dolores River.

Livestock Grazing

A total reduction in active qualifications of 12,658 AUMs on public lands would result from reduced grazing on 33 allotments.

The grazing systems designed for six allotments prescribe no grazing every third year. This would result in initial reductions in grazing totaling 640 AUMs every third year.

Although the Sewemup Mesa and Dolores River areas have little potential for grazing use, their withdrawal from any future grazing use would result in a loss of 25 AUMs of livestock use.

Operators on the 89 AMP (intensive) allotments would have higher operating costs arising from increased herding of cattle and maintenance of proposed range improvements. Operators would have to make more frequent visits to allotments to gather and move livestock to the next pasture designated for use.

TABLE 5-1

ALLOTMENTS WITH WINTER CONCENTRATION AREAS AND WILDLIFE/LIVESTOCK COMPETITION

Deferred Rotation

Dugway (145*)
Whitewater (203)
Bulldraw Common (401)
Wright Draw (405)
Blue Mesa (406)
Sinbad Valley Common (409)
Ute Creek Common (410)
North Creek (416)
Coal Gulch-Roan Creek (502R)
Garr Mesa (503)
Buniger (505)
Whittaker Flats (754)
Spring Creek to Coon Creek (807)

Best Pasture

Winter Flats (713)

Less Intensive Management

Unaweep North (417a)
Unaweep South (417b)
Mule Trail Draw (421)
EHL and West Creek (423)
North Unaweep (425b)
Nelson Ranch (428)
Etcheverry (720)
Kimbal (724)
Webber (750)
Gaptor (820)

Rest Rotation

Kannah Creek Common (202)
Wagon Park Common (302E)
Palisade Flats (401)
Big Salt (501E)
Little Salt (507)
East Salt (602E)
Spears (703)
Rodeo Grounds (710)
Coon Hollow Common (712)
Round Mountain (745)
Lyons-Anderson (811)

NOTE: E indicates existing AMP, R indicates allotment has other pastures under rest rotation, and * indicates allotment is partially located in Utah.

Socioeconomic Conditions

There are three impacts which could not be avoided. First, operators would be required to assume an estimated $7,943 in annual maintenance costs. This amount would be spread among all operators with AMP (intensive) allotments.

Second, there would be a short-term (possibly long-term) reduction in income for 42 families as a result of forage utilization reductions for 40 ranches. This could cause some of the ranches to cease as an economic unit.

Third, there would be a decrease in the carrying capacity of the 40 ranches associated with allowable use reductions of 12,683 AUMs, or 1,054.92 animal units of carrying capacity. This reduction could translate into an estimated reduction of $1,054,920 in the relative market value of base ranch properties associated with the reduction. It is estimated that this reduction in market value could reduce the ES area tax base by about $52,746.

Visual Resources

The three intensive AMP grazing systems; all of the vegetation manipulation projects; and water catchments, wells, and roads and trails would result in discordant impacts in one or more VRM classes.

Recreation

Camping, picnicking, hiking, sightseeing, and vehicle play in vegetation manipulation areas would decrease due to the visual disturbance and alteration of the natural setting. The short-term removal of wildlife food and habitat would adversely impact hunting and sightseeing opportunities.

The 128 miles of proposed fence would be an inconvenience to hikers and hunters and a safety hazard to snowmobilers and motorcyclists. Sightseeing quality and opportunities for solitude would be reduced; this impact would be minor except for roads, which would have a major impact in localized areas.

Wildland Areas

The nonwilderness portions of wildland areas could be adversely impacted by the construction of proposed range improvements. This conflict would have to be resolved by the District Manager prior to implementation of the proposed action.

Air Quality

Implementation of the three AMP grazing systems could increase the rate of spread of wildfires, which currently occur at the rate of 50 per year; this would increase smoke. The prescribed burning of 1,000 acres would cause a localized increase in suspended dust for the two years required for revegetation to begin to occur and would create an increase in smoke during the actual burning process. There would be a long-term, localized increase in suspended dust particles due to vehicular travel on 8 miles (20 acres) of improved roads and trails.

Cultural Resources

Despite the requirement for cultural resources clearances (see chapter 1) and the mitigating measures presented in chapter 4, cultural resources may sustain damage, with some being destroyed. Cultural resource examinations would not identify all sites. Many buried by alluvium would remain totally obscured from view. Thus some impacts from vegetation manipulation and range facilities, i.e., destruction of walls, wikiups, pottery, lithics, and historic structures, would be inevitable.

The excavation and salvage operations mentioned in chapter 4 would themselves have an adverse impact. Recordation would yield information that would otherwise be lost. However, once excavated, a site is effectively destroyed and removed from future research considerations, which may utilize different analytical techniques. Salvage is rarely as effective as nonsalvage research programs because of more stringent time limitations, funding, and personnel availability. If a site could be left undisturbed and could be avoided by project redesign, then excavation could be postponed until more sophisticated methods and analytical devices are available. This would allow a greater potential for recovery of information.

Vandalism from construction workers and public land users who may take advantage of increased access resulting from the proposed action would go largely unmitigated. Experience has shown that education and law enforcement have only limited success in curbing vandalism.

CHAPTER 6

CHAPTER 6

THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

This chapter discusses the productivity of the environment which would be affected by the implementation and operation of the proposal. In this context, "short-term" refers to the twenty years required to implement the proposal and achieve the stated objectives. "Long-term" refers to the period of time beyond 20 years.

Cumulative Impacts

The proposed action would not generally lead to impacts beyond those discussed in chapters 3 and 5. However, widespread success on the intensively managed allotments could lead to the application of intensive grazing management on additional allotments on public lands. This would result in impacts similar to those discussed for the proposal.

The major factor in the ES area's future is expected to be the exploration for, and development of, oil, oil shale, coal, and natural gas. These activities would probably have profound social and economic impacts. However, grazing management would have little, if any, effect on energy development activities and impacts. Energy development, on the other hand, could have significant impacts on grazing management as land is diverted from livestock operations to mining activities and residential and commercial development. (See BLM FES *Proposed Development of Oil Shale Resources by the Colony Development Operation in Colorado* and *Draft West-Central Colorado Coal Environmental Statement.*)

Long-term adverse impacts arising out of the proposal over the entire ES area are listed below. Note that impacts associated with high density grazing periods, while of only several weeks' or months' duration, are considered to be long-term since they would occur repeatedly as long as the grazing systems are in effect, i.e., well beyond 20 years into the future.

1. Reductions in foliage volume and plant carbohydrate stores during each periodic, high density grazing period.
2. Modification of 10,835 acres of pinyon-juniper and mountain shrub types due to vegetation manipulation.
3. A decrease of five AUM's of forage production resulting from the loss of 93 acres to range facilities.
4. Increased soil compaction and decreased litter during periods of high density grazing.
5. The loss of 47 to 78 tons/acres/year of soil attributable to the 8.1 miles of roads and trails.
6. The loss of 10,835 acres of big game cover due to vegetation manipulation.
7. Loss of 64 acres of wildlife habitat to water facilities.
8. An increase in big game mortality of no more than five animals per year due to fencing.
9. Increased wildlife/livestock competition during periods of high density grazing.
10. The loss of an unknown amount of riparian and aquatic habitat due to the replacement of surface flow with piping.
11. An increase of total dissolved solids in reservoirs, along with a decrease of 3 to 18 percent in runoff.
12. Higher operating costs on the 89 intensively managed allotments because of increased herding of livestock and maintenance of range facilities.
13. Initial decreases in income, market values, and ES area tax base due to stocking reductions.
14. The creation of visual contrasts due to juxtaposition of grazed and rested pastures, vegetation manipulation, and range facilities.
15. Decreased recreational usage due to disturbances created by the presence of range facilities.
16. Increased vandalism and inadvertent damage to cultural resources.

Trends Significantly Impacting Environmental Values

The proposal would result in the the following trends:

1. Improvement in vegetation, soil, watershed, and wildlife resource values (see chapter 3 for quantification of improvements as they would exist in the year 2000).
2. Increases in active qualifications, income, market values, and the ES area tax base.

3. Offsetting beneficial and adverse impacts on visual resources. Increased visual quality of vegetation over the entire ES area would offset local visual disturbances created by the juxtaposition of grazed and rested pastures and the presence of vegetation manipulation projects and range facilities.

4. A slight decrease in recreational usage, particularly usage by those interested in sightseeing or seeking solitude and natural surroundings.

5. Potential degradation (loss or destruction) of cultural resources.

Long- and Short-Term Benefits

This section enumerates long- and short-term benefits arising out of the proposal and highlights the tradeoffs (adverse impacts) necessary to bring these about. Benefits and tradeoffs are summarized in table 6-1.

Risks to Health and Safety

The proposal would result in minimal risks to health and safety. The 128 miles of fence to be constructed as part of the proposal would be a safety hazard for snowmobilers, motorcyclists, and horseback riders. The level of risk is considered to be minimal.

Alteration in Quality of Life

The proposal would generally improve the quality of life. The increased vegetation production would result in increased production of red meat and wool, which would benefit both livestock operators and the public. Improvement in wildlife habitat and numbers would increase recreational opportunities, i.e., hunting and sightseeing.

Less tangible, but perhaps most important, is the overall protection and enhancement of environmental resources -- vegetation, soil, water, and wildlife -- for both present and future generations. These resources are useful not only for commodity production; they also contribute to the quality of recreational and wilderness experiences.

As table 6-1 shows, tradeoffs would be necessary to achieve the objectives of the proposal. In some cases, quality of life would be decreased in local areas or for specific individuals. Overall, however, quality of life would be enhanced should the proposal be implemented.

Relationship of Proposal to NEPA Goals

Table 6-2 illustrates how the proposal relates to the environmental goals established in Section 101(b) of the National Environmental Policy Act (NEPA). Benefits, tradeoffs, and net impacts are shown as they relate to twenty specific goals.

Summary

Taking into account both the benefits and tradeoffs which would result from implementation of the proposal, the net effect would be an enhancement of natural ecosystem productivity (vegetation, soils, watershed, and wildlife) and human productivity (active qualifications, income, market values, and ES area tax base). The proposal would generally support NEPA Section 101(b) goals. There would be minimal risks to health and safety.

TABLE 6-1

BENEFITS AND TRADEOFFS

	Long-term Benefits	Tradeoffs[1/]
1.	Increased plant vigor & production (11,704 AUMs) due to frequent rest from grazing.	Reductions in foliage volume & plant carbohydrate stores during periodic, high density grazing periods.
2.	Increase of 10,835 (1,111 AUMs) of acres of grasses and forbs.	Loss of 10,835 acres of pinyon-juniper and mountain shrub types.
3.	More widespread water distribution and improved handling facilities for livestock.	Decrease of five AUMs of forage production due to loss of 93 acres occupied by range facilities.
4.	Increased soil productivity & decreased erosion rates	Increased soil compaction & decreased litter during periods of high density grazing.
5.	Increased ease of livestock movement over rough terrain & improved access for ranchers and BLM range management personnel.	Loss of 47 to 78 tons/acre/year of soil attributable to 8.1 miles of roads and trails.
6.	Increased wildlife forage on 10,835 acres.	Loss of big game cover on 10,835 acres due to vegetation manipulation
7.	Increase in water sources available for wildlife use.	Loss of 64 acres of wildlife habitat to water facilities.
8.	Improved livestock/wildlife forage resulting from improved control and distribution of livestock.	Increase in big game mortality of no more than five animals per year due to fencing.
9.	Improved wildlife forage on all intensively managed allotments.	Increased wildlife/livestock competition during periods of high density grazing.
10.	Better distribution of water.	Loss of unknown amount of riparian and aquatic habitat due to replacement of surface flow with piping.
11.	Better protection for aquatic and riparian environments due to fencing of reservoirs, springs, and overflows.	N/A
12.	Increased water sources for livestock and wildlife & improved livestock distribution.	Increased total dissolved solids in reservoirs & decreased runoff (3 to 18 percent).
13.	Increase over present level of active qualifications.	Higher operating costs on the 89 intensively managed allotments because of increased herding of livestock and maintenance of range facilities.
14.	Increases in income, market values, & ES area tax base.	Initial decreases in income, market values, & tax base due to stocking reductions.
15.	Improved visual quality due to increased vegetation and decreased erosion.	Creation of visual contrasts due to juxtaposition of grazed and rested pastures, vegetation manipulation, & range facilities.
16.	Improvements in wildlife numbers and fishing conditions.	Decreased recreational usage due to disturbances created by vegetation manipulations and range facilities.
17.	Decreased damage to cultural resources due to decreased soil erosion.	Increased vandalism and inadvertent damage to cultural resources.

NOTE: Some short-term tradeoffs (impacts), e.g., the decreases in productivity and increases in erosion occurring for the first five years following vegetation manipulation, have not been included in this table.

[1/] These tradeoffs correspond to the numbered impacts listed in the Cumulative Impacts section of this chapter.

TABLE 6-2

RELATIONSHIP OF PROPOSAL TO NEPA GOALS

IMPACTS (BENEFITS, TRADE-OFFS, & NET IMPACTS) NEPA GOALS	Increased plant vigor and production	Reductions in foliage volume & plant carbohydrates -- high density grazing	Net impact	Increase of 10,835 ac. grasses & forbs	Loss of 10,835 ac. of P-J and mountain shrub types	Net impact	Better water distribution & improved livestock handling facilities	Decrease of 5 AUMs in forage production & loss of 92 acres	Net impact	Increased soil productivity & decreased erosion rates	Increased compaction & decreased litter -- high density grazing	Net impact
Fulfill responsibilities of each generation as trustee of environment for future generations	+	−	+							+	−	+
Assure for all Americans safe surroundings[1]												
Assure for all Americans healthful surroundings[1]												
Assure for all Americans productive surroundings	+	−	+	+	−	+	+	−	+	+	−	+
Assure for all Americans aesthetically pleasing surroundings	+	−	+							+	−	+
Assure for all Americans culturally pleasing surroundings										+	−	0
Attain widest range of beneficial uses of environment without degradation	+	−	+				+	−	+	+	−	+
Attain widest range of beneficial uses of environment without risk to health[1]												
Attain widest range of beneficial uses of environment without risk to safety[1] of people												
Attain widest range of beneficial uses of environment without undesirable consequences	+	−	+				+	−	+	+	−	+
Attain widest range of beneficial uses of environment without unintended consequences[2]		*									*	
Preserve important historic aspects of our national heritage										+	−	0
Preserve important cultural aspects of our national heritage										+	−	0
Preserve natural aspects of our national heritage	+	−	+							+	−	+
Maintain an environment which supports diversity	+	−	+							+	−	+
Maintain an environment which supports variety of individual choice	+	−	+							+	−	+
Achieve a balance between population & resource use which will permit high standards of living												
Achieve a balance between population & resource use which will permit a wide sharing of life's amenities[3]												
Enhance the quality of renewable resources	+	−	+				+	−	+	+	−	+
Approach the maximum attainable recycling [or preservation] of depletable resources												

IMPACTS (BENEFITS, TRADE-OFFS, & NET IMPACTS) NEPA GOALS	Increased ease of livestock movement & improved access	Loss of 47 to 78 t/ac/yr of soil from 8.1 mi. of roads & trails	Net impact	Increased wildlife forage on 10,835 ac.	Loss of big game cover on 10,835 ac.	Net impact	Increase in water sources for wildlife use	Loss of 62 ac. of wildlife habitat to water facilities	Net impact	Improved forage -- improved control & distribution of livestock	Increase in big game mortality (5 animals per year max) due to fencing	Net impact	Improved wildlife forage on all intensively managed allotments	Increased wildlife/live stock competition -- high density grazing	Net impact	Better distribution of water	Loss of unknown amount of wetland habitat	Net impact
Fulfill responsibilities of each generation as trustee of environment for future generations				+	−	+	+	−	+				+	−	+			
Assure for all Americans safe surroundings[1]																		
Assure for all Americans healthful surroundings[1]																		
Assure for all Americans productive surroundings	+	−	+	+	−	+	+	−	+	+	−	+	+	−	+	+	−	+
Assure for all Americans aesthetically pleasing surroundings																		
Assure for all Americans culturally pleasing surroundings																		
Attain widest range of beneficial uses of environment without degradation	+	−	+	+	−	+	+	−	+	+	−	+	+	−	+	+	−	+
Attain widest range of beneficial uses of environment without risk to health[1]																		
Attain widest range of beneficial uses of environment without risk to safety[1] of people																		
Attain widest range of beneficial uses of environment without undesirable consequences	+	−	+	+	−	+	+	−	+	+	−	+	+	−	+	+	−	+
Attain widest range of beneficial uses of environment without unintended consequences[2]											*			*			*	
Preserve important historic aspects of our national heritage																		
Preserve important cultural aspects of our national heritage																		
Preserve natural aspects of our national heritage													+	−	+			
Maintain an environment which supports diversity							+	−	+				+	−	+	+	−	+
Maintain an environment which supports variety of individual choice							+	−	+				+	−	+			
Achieve a balance between population & resource use which will permit high standards of living																		
Achieve a balance between population & resource use which will permit a wide sharing of life's amenities[3]																		
Enhance the quality of renewable resources				+	−	+	+	−	+	+	−	+	+	−	+	+	−	+
Approach the maximum attainable recycling [or preservation] of depletable resources																		

IMPACTS (BENEFITS, TRADE-OFFS, & NET IMPACTS) NEPA GOALS	Better protection for wetland environments due to fencing	Increased water sources for livestock & wildlife; improved livestock distribution	Increased total dissolved solids in reservoirs & decreased runoff	Net impact	Increase over present level of active qualifications	Higher operating costs on 89 int. managed allotments	Net impact	Increases in income, market values, & ES area tax base	Short-term decreases in income, market values, & tax base	Net impact	Improved visual quality due to incr. vege. & decreased erosion	Creation of visual contrasts by proposal	Net impact	Improvements in wildlife nos. & fishing conditions	Decreased recreational usage due to environmental disturbances	Net impact	Decreased damage to cultural resources due to decreased soil erosion	Increased vandalism & inadvertent damage to cultural resources	Net impact
Fulfill responsibilities of each generation as trustee of environment for future generations	+										+	−	0	+	−	−	+	−	−
Assure for all Americans safe surroundings[1]																			
Assure for all Americans healthful surroundings[1]																			
Assure for all Americans productive surroundings	+	+	−	+	+	−	+	+	−	+				+	−	−			
Assure for all Americans aesthetically pleasing surroundings	+										+	−	0						
Assure for all Americans culturally pleasing surroundings																	+	−	−
Attain widest range of beneficial uses of environment without degradation	+	+	−	+	+	−	+	+	−	+				+	−	−	+	−	−
Attain widest range of beneficial uses of environment without risk to health[1]																			
Attain widest range of beneficial uses of environment without risk to safety[1] of people																			
Attain widest range of beneficial uses of environment without undesirable consequences	+	+	−	+	+	−	+	+	−	+	+	−	0	+	−	−	+	−	−
Attain widest range of beneficial uses of environment without unintended consequences[2]						*			*									*	
Preserve important historic aspects of our national heritage																	+	−	−
Preserve important cultural aspects of our national heritage																	+	−	−
Preserve natural aspects of our national heritage	+										+	−	0						
Maintain an environment which supports diversity	+	+	−	+															
Maintain an environment which supports variety of individual choice	+												+	−	−				
Achieve a balance between population & resource use which will permit high standards of living					+	−	+	+	−	+									
Achieve a balance between population & resource use which will permit a wide sharing of life's amenities[3]																			
Enhance the quality of renewable resources	+	+	−	+															
Approach the maximum attainable recycling [or preservation] of depletable resources																	+	−	−

NOTE: Benefits and tradeoffs are presented in the same order as they are in table 6-1. Symbols used are: + = positive contribution to NEPA goal, − = negative contribution, and 0 = offsetting positive and negative contributions.

[1] None of the listed impacts directly affects health or safety; see section on "Risks to Health and Safety" in this chapter.

[2] Asterisk(*) indicates unforeseen adverse impacts are possible; see Monitoring Programs section in chapter 4 for information on procedures for detecting deviations from predicted responses.

[3] There is no known relationship between the proposal and an increase in the sharing of life's amenities.

CHAPTER 7

CHAPTER 7

ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

This chapter identifies the irreversible and irretrievable commitment of resources resulting from the proposed action. The term *irreversible* refers to use that is incapable of being reversed; once initiated, use would continue. The term *irretrievable* means essentially irrecoverable or not reasonably retrievable; once used, the resource would not be readily replaceable.

Vegetation manipulation would result in the irreversible loss of 10,835 acres of pinyon-juniper and mountain shrub vegetation types. It would also result in an initial, irretrievable loss of soil due to increased erosion.

Range facilities would result in the loss of the 93 acres occupied by the facilities. Loss of forage for the area removed from production would be irretrievable and amount to approximately five animal unit months (AUMs) annually for the life of the proposed projects. Soil disturbance would result in some irretrievable losses of soil in the short term. The 8.1 miles of roads and trails would result in a long-term, irretrievable loss of between 46.93 and 77.66 tons of soil per acre per year, or between 598 and 989 tons per year overall.

The development of springs could dry up surrounding wet meadow areas. Remnant populations of plants and animals adapted to these wet microhabitats would then disappear. The loss of these organisms would be irretrievable.

Some recreation resources would be irretrievably lost during the life of range improvement projects. These projects, particularly roads, would decrease sightseeing quality and opportunities for solitude.

The proposed livestock grazing systems and the development of range facilities could disturb certain cultural resources, either through direct impact or through vandalism. Once disturbed, historical and archeological sites, as well as artifacts, would no longer be available for future study. This would deplete or alter the nonrenewable cultural resource base and could result in a data gap in the history of an area. Cultural resource losses would be irreversible and irretrievable.

The proposed action would involve the commitment of material associated with the proposed improvements. Once installed, these materials would basically be irretrievably committed, though the materials might have some salvage value.

The major irreversible and irretrievable commitment would involve the costs associated with installation, maintenance, and administration of the proposal. Once the expenditures were made, those particular funds would not be available for other alternative public programs. An additional irretrievable commitment would involve the labor associated with the proposal. Labor, too, once expended could not be retrieved. Irretrievable losses of tax revenue would be realized where reductions in livestock use occurred.

CHAPTER 8

CHAPTER 8

ALTERNATIVES TO THE PROPOSED ACTION

Introduction

This chapter presents six alternatives to the proposed action. These alternatives include (A) No Action (maintaining the status quo, *no* stocking reductions), (B) Continuation of Present Grazing Management (stocking reductions but no implementation of proposed intensive management AMPs), (C) Elimination of Grazing (no livestock grazing on public lands in the ES area), (D) Wildlife Effective (favors wildlife objectives), (E) Watershed Effective (favors watershed objectives), and (F) Elimination of Spring Grazing.

The alternatives represent a wide range of reduction in current stocking levels: 100 percent (94,822 AUMs) reduction with elimination of grazing, 42 percent (39,638 AUMs) with elimination of spring grazing, 29 percent (27,244 AUMs) reduction with the wildlife effective alternative, 21 percent (20,315 AUMs) with the watershed effective alternative, 13 percent (12,683 AUMs) with the proposed action and continuation of present grazing management, and 0 percent with no action. Table 8-1 shows the stocking levels for each of the intensively managed allotments under each of the six alternatives.

The wildlife and watershed alternatives were specifically chosen because they optimize two important and widespread uses of public lands. They are also closely related to vegetation response.

Either the proposed action or one of the alternatives could be chosen for each allotment. The District Manager would consider allotments individually when deciding which course of action to follow. Thus one allotment could be managed under the proposed action, another allotment under alternative A, another under alternative C, etc. Should this occur, an additional assessment of impacts (supplemental ES) may be necessary prior to implementation to insure this ES correctly assessed the aggregate impact of the action to be implemented.

The 11 existing AMPs, 78 proposed intensive management AMPs, 88 less intensively managed allotments, and elimination of grazing on 2 areas identified in the proposed action are considered in each of the alternatives. Unless otherwise stated, impacts of all alternatives are analyzed in terms of projected conditions in the year 2000. The point of reference is the present environment as described in chapter 2.

ALTERNATIVE A: NO ACTION

Under this alternative, livestock grazing would be managed at a low intensity. Further implementation of existing AMPs would not occur and additional AMPs would not be developed. No range facility projects would be implemented. Stocking rates and season of use would remain the same as they are at present.

All areas in the Grand Junction Resource Area would be managed in a similar fashion. It is assumed that no increases or reductions in livestock grazing levels would occur on any of the allotments. The elimination of grazing on the two areas described in chapter 1 would not be imposed.

Impact Analysis

Vegetation

Analysis of available photographs and plot data of condition and trend transects indicates the range condition and trend is up on two of the fully implemented, and four of the partially implemented, existing intensive AMPs. Although further implementation of the four AMPs and monitoring of condition and trend on these allotments, which comprise 117,253 acres, is not anticipated under this alternative, it is expected that trend would continue upward and range condition, forage production, species composition, plant vigor, and litter accumulation would also continue to improve. The range condition and trend on the five remaining existing AMPs (one fully, three partially, and one not implemented), which comprise 164,704 acres, is expected to remain static.

Eighty-eight allotments comprising 79,210 acres would be subject to less intensive management. No range condition and trend transect data is available on these areas, but analysis of the information collected for development of the proposed less intensive management plans indicates that the present general range condition is fair to good and trend static to upward. Under the no action alternative,

TABLE 8-1

AUM'S OF PRESENT PRODUCTION, PRESENT USE, AND STOCKING LEVELS FOR EACH ALTERNATIVE

Allotment No. and Name$^{1/}$	Present Production^{2}	Present Use	Proposed Action	Stocking Levels (AUMs) A	B	C	D	E	F
Deferred Rotation									
103 Haystack	57	153	57	153	57	0	57	57	57
105 South of the Road	30	57	30	57	30	0	29	30	11
106E East Toms Canyon	205	205	205	205	205	0	205	205	63
108 Longshore	298	274	274	274	274	0	270	274	274
113 Fessler	38	53	38	53	38	0	38	38	11
115 Spring Creek	603	382	382	382	382	0	30	382	350
125 Aubert Brothers	2,561	1,995	1,919	1,995	1,919	0	1,917	1,919	1,705
130 Colo-Black Ridge	1,635	1,118	1,118	1,118	1,118	0	1,109	1,118	573
133 Reservation	396	122	122	122	122	0	122	122	94
135 Knowles-Little Dolores Bench	829	331	331	331	331	0	331	331	208
137 Timber Ridge	595	221	221	221	221	0	221	221	221
145* Dugway	331	554	331	554	331	0	312	217	331
152 Round Knob	327	342	327	342	327	0	327	327	253
154* Lost Canyon-Sugar Bench	2,168	2,791	2,168	2,791	2,168	0	936	2,168	2,168
161 Coates Creek	22	26	22	26	22	0	22	22	0
163R King	1,295	1,613	1,295	1,613	1,295	0	1,223	1,295	1,022
203 Whitewater Common	2,569	2,422	2,422	2,422	2,422	0	1,257	1,269	1,377
304 Woodring	256	75	75	75	75	0	40	75	2
402 Bulldraw Common	307	182	182	182	182	0	45	137	137

TABLE 8-1 (Continued)

AUM'S OF PRESENT PRODUCTION, PRESENT USE, AND STOCKING LEVELS FOR EACH ALTERNATIVE

Allotment No. and Name[1/]		Present Production[2]	Present Use	Proposed Action	Stocking Levels (AUMs)					
					A	B	C	D	E	F
405	Wright Draw	138	138	138	138	138	0	20	119	119
406	Blue Mesa	1,099	2,408	1,099	2,408	1,099	0	731	580	991
407	Bull Hill - Maverick	553	564	553	564	553	0	458	288	294
409	Sinbad Valley Common	641	766	641	766	641	0	184	365	470
410	Ute Creek Common	464	260	260	260	260	0	102	130	165
411	Dolores River	103	356	103	356	103	0	103	80	103
416	North Creek	257	55	55	55	55	0	27	26	29
419	Hubbard	2,859	831	831	831	831	0	373	75	275
420	GML	129	350	86	350	86	0	63	65	129
424	Bergis North Mesa	464	143	143	143	143	0	143	0	126
429*	Dolores Point	910	1,001	910	1,001	910	0	645	379	418
433	Hamilton	56	49	49	49	49	0	48	49	49
503	Garr Mesa	2,439	2,645	2,439	2,645	2,439	0	699	2,439	1,826
505	Buniger	160	60	60	60	60	0	60	60	50
506	Laphman Canyon common	276	435	276	435	276	0	276	276	276
508	Mogensen	125	67	67	67	67	0	67	67	67
603	West Salt Common	2,949	8,187	2,949	8,187	2,949	0	1,404	2,949	2,949
604	Crow Bottom	211	244	211	244	211	0	192	211	122
612	Baker-Bitter Creek	7,570	1,026	1,026	1,026	1,026	0	241	1,026	380
616	Prairie Canyon-Johns Canyon	3,552	668	668	668	668	0	668	668	578
702	Berry Homestead	347	218	215	218	215	0	23	215	85
705	Brush Mountain	1,221	869	869	869	869	0	869	869	869
706	Burdick E. of Ranch/Tater Hills	700	267	267	267	267	0	267	267	47
714	Doughtery Gulch	402	140	140	140	140	0	140	140	140
715	Dry Fork	1,120	564	564	564	564	0	64	564	399
721	Head of Carr Creek	440	250	250	250	250	0	217	250	250

TABLE 8-1 (Continued)

AUM'S OF PRESENT PRODUCTION, PRESENT USE, AND STOCKING LEVELS FOR EACH ALTERNATIVE

Allotment No. and Name[1]/				Stocking Levels (AUMs)					
	Present Production[2]	Present Use	Proposed Action	A	B	C	D	E	F
732 Logan End Common	363	365	363	365	363	0	363	363	363
733 Logan Gulch	553	508	508	508	508	0	0	508	95
742 Paddock	272	245	245	245	245	0	243	245	207
748 Upper Brush Mountain	580	306	306	306	306	0	306	306	306
754 Whittaker Flats	624	238	238	238	238	0	237	238	238
755 4A Individual	79	34	34	34	34	0	34	34	0
807 Spring Creek to Coon Creek	1,230	513	513	513	513	0	251	513	262
808 White Mountain Common	762	401	401	401	401	0	401	401	181
809 Wild Country Common	7,020	746	740	746	740	0	740	740	91
811 Lyons-Anderson	351	424	351	424	351	0	351	351	351
844 Lower Rapid - Cottonwood	917	279	278	279	278	0	278	70	171
843 Big Park	806	759	759	759	759	0	759	759	196
847 Jerry Gulch	217	158	158	158	158	0	158	158	3
Subtotal	45,763	40,453	31,282	40,453	31,282	0	20,696	27,050	22,527
Rest Rotation									
101E Fish Park	570	570	570	570	570	0	570	570	250
116 Bangs Canyon	5,423	2,578	2,458	2,578	2,458	0	2,273	2,458	1,793
141 Three Canyons	544	472	472	472	472	0	467	472	26
148 Thompson - Northeast Creek	438	134	134	134	134	0	134	134	90
150 Meinhart	131	80	80	80	80	0	79	80	80
157 Boulder Canyon - Ladder Canyon	563	274	274	274	274	0	274	274	239
201E Davis	427	427	427	427	427	0	427	227	323
202 Kannah Creek Common	2,741	3,698	2,741	3,698	2,741	0	1,138	1,902	2,741
301E Gibbler Common	3,315	3,315	3,315	3,315	3,315	0	3,256	2,635	2,432
302E Wagon Park Common	1,164	1,164	1,164	1,164	1,164	0	1,113	724	402
401 Palisade Flats	**575**	**400**	**400**	**400**	**400**	**0**	**283**	**165**	**119**

TABLE 8-1 (Continued)

AUM'S OF PRESENT PRODUCTION, PRESENT USE, AND STOCKING LEVELS FOR EACH ALTERNATIVE

Allotment No. and Name1/				Stocking Levels (AUMs)					
	Present Production2	Present Use	Proposed Action	A	B	C	D	E	F
501E Big Salt	1,299	1,299	1,299	1,299	1,299	0	1,299	1,299	777
502D Coal Gulch - Roan Creek	2,553	1,876	1,876	1,876	1,876	0	1,735	1,876	1,731
504 Hunter Wash	1,148	1,411	1,148	1,411	1,148	0	736	1,148	879
507 Little Salt	3,056	2,734	2,199	2,734	2,199	0	2,199	2,199	1,369
509E Mt. Garfield Common	1,900	1,900	1,900	1,900	1,900	0	1,900	1,900	1,583
601 Badger Wash	1,153	857	840	857	840	0	840	840	857
602E East Salt	9,928	9,928	9,928	9,928	9,928	0	9,879	9,928	2,072
610 Maluy	238	168	168	168	168	0	168	168	0
703 Spears	2,489	1,677	1,674	1,677	1,674	0	1,509	1,674	1,355
704E Corcoran Wash	1,296	1,296	1,296	1,296	1,296	0	1,296	1,296	1,184
710 Rodeo Grounds	1,400	1,176	1,176	1,176	1,176	0	628	1,176	411
712 Coon Hollow Common	1,218	1,657	1,218	1,657	1,218	0	1,218	1,218	523
723 Henderson/4A Ridge	1,956	1,252	1,252	1,252	1,252	0	1,252	1,252	1,230
724 Kimball	2,316	807	807	807	807	0	807	807	663
737 Lower Roan Creek Common	474	206	206	206	206	0	204	206	123
744 Roan Creek Common	2,657	448	448	448	448	0	448	448	403
745 Round Mountain	2,279	1,148	727	1,148	727	0	724	727	473
801E Sunnyside Common	1,077	1,077	1,077	1,077	1,077	0	1,077	1,077	630
Subtotal	54,328	44,029	41,274	44,029	41,274	0	37,933	38,880	24,758
Best Pasture									
613 Rabbit Valley	815	1,547	815	1,547	815	0	181	815	815
713E Winter Flats	2,505	2,505	2,505	2,505	2,505	0	2,505	2,505	2.309
Subtotal	3,320	4,052	3,320	4,052	3,320	0	2,686	3,320	3,124
Total for intensive AMPs	103,124	88,534	75,876	88,534	75,876	0	61,662	69,250	50,409
Total for less intensive AMPs3/	6,263	6,263	6,263	6,263	6,263	0	6,263	5,257	4,775

TABLE 8-1 (Continued)

AUM'S OF PRESENT PRODUCTION, PRESENT USE, AND STOCKING LEVELS FOR EACH ALTERNATIVE

Allotment No. and Name[1/]				Stocking Levels (AUMs)					
	Present Production[2]	Present Use	Proposed Action	A	B	C	D	E	F
Elimination of Grazing Areas	318	25	0	25	0	0	0	0	0
GRAND TOTAL	109,705	94,822	82,139	94,822	82,139	0	67,578	74,507	55,184

NOTE: Units of measurement are livestock forage AUMs.

1/ E indicates an existing AMP, R indicates allotment has other pastures under rest rotation, D indicates allotment has other pastures under deferred rotation, and * indicates allotment is partially located in Utah.

2/ Methodology used for determining present production is in appendix 3.

3/ No production data was available for the 88 less intensive AMPs they are therefore not presented individually in this table. The figure for present production for the 88 allotments is based on present licensed use.

vegetation on these 88 allotments is expected to remain in its present fair or good condition or improve. Improvement would be more rapid on areas of allotments located in or above the 14-inch precipitation zone; these areas encompass 36,213 acres.

Due to limited livestock water on, and access to, the two areas (15,887 acres) proposed for elimination of grazing in chapter 1, the range vegetation condition and trend is expected to remain static.

Vegetation condition and production would be expected to remain static or decline on most of the remaining 1,184,970 acres of public land in livestock allotments. The areas located in or above the 14-inch precipitation zone would be most likely to remain static, while those in lower zones would be expected to decline. Exceptions would occur in both zones, depending on grazing practices and pressures. Any decline in range and vegetation condition would be reflected in decreased vegetation production, density, species composition, and ground cover.

There would be little control anywhere in the ES area over livestock distribution and forage utilization. Some areas which have historically been favorite grazing locations would continue to receive heavy grazing pressure. These are preferred locations along stream bottoms and adjacent to available water sources where livestock have a tendency to congregate. Little-used areas would continue to receive limited use.

Since vegetation composition is determined largely by grazing in the subclimax state of vegetation development (Stoddard, Smith, and Box 1975), the species composition on most of the area would not be expected to improve. Desirable species, such as Indian ricegrass, crested wheatgrass, winterfat, and bitterbrush, would continue to receive the same heavy grazing use they are experiencing now and, in many areas, would slowly decline in vegetative vigor, reproduction, and seedling establishment. This trend would lead to the spread of undesirable species, such as halogeton, Russian thistle, and snakeweed. Without intensive management to identify and correct these problems, no increase in vegetation condition could be expected on the areas under this alternative.

Overall, the no action alternative would result in deceased range vegetation quality and quantity. This would be a long-term, adverse impact. Table 8-2 quantifies the anticipated vegetation impacts of Alternative A.

Threatened and Endangered Plants (Proposed)

The no action alternative could adversely impact threatened and endangered plants in the future. There are nine known threatened and endangered plant species occurring on small, scattered areas in the ES area. Another fourteen species are suspected to occur.

Continued overgrazing on those allotments where vegetation is predicted to decline could cause livestock to range further and further in search of palatable forage. Everything available and palatable would be subject to utilization. This would result in:

1. The greater possibility of trampling as livestock searched out available forage.
2. Plants being eaten as the more desirable forage plants were removed from the range.
3. Increased competition as weedy species moved in and outcompeted threatened and endangered plants.

The overall effect would be an indirect pressure on as many as 23 threatened and endangered species which could be eliminated in the ES area.

Soils

Where range condition and trend is upward for six of the existing AMPs (two fully and four partially implemented), comprising 117,253 acres, litter accumulation and organic matter content in surface soils would increase. This, in turn, would improve soil structure, infiltration, permability, porosity, and soil productivity. Since soil properties would improve, soil erosion would decrease. This reduction in erosion would be reflected in the erosion condition classes (SSFs). For the five remaining AMPS (one fully, three partially, and one not implemented) where range condition and trend is static, soil properties would remain essentially unchanged. Table 8-3 shows the comparsion between present and future erosion condition classes for the eleven existing AMPs.

Since vegetation condition with this alternative is expected to remain static or decline slightly on the 78 allotments selected for intensive management under the proposed action, soil properties and erosion would remain essentially unchanged. Erosion condition for these allotments would be very similar to the present situation.

Chapter 1 proposed 88 allotments encompassing 79,210 acres for less intensive management. These would be administered in an identical manner under this alternative. Impacts to soils on these allotments would be identical to those arising out of the proposed action; see chapter 3.

Table 8-4 portrays the anticipated overall impacts of alternative A on erosion condition classes.

Water Resources

The six existing AMPs which have been fully or partially implemented and are showing improvement in range trend would respond much the same as the 78 intensive management AMPs would under the proposal (see chapter 3). The remaining

TABLE 8-2

IMPACTS ON VEGETATION
NO ACTION

	Present[1/]	Predicted[1/]
Range Condition[2/] (ac.)		
Good	216,885	192,684
Fair	566,403	505,477
Poor	417,569	502,696
Production (AUMs)	109,705	86,269

NOTE: Data encompasses all public land acreage.

[1/] Methodologies used to determine present and predicted range condition and production are located in appendix 3.

[2/] Range condition refers to forage, not ecological, condition.

TABLE 8-3

EROSION CONDITION CLASSES OF ELEVEN EXISTING AMPs WITH NO ACTION

Allotment Name and No.	Present Erosion Condition Class (Acres)						Future Erosion Condition Class (Acres)				
	Stable	Slight	Moderate	Critical	Severe	Total Acres	Stable	Slight	Moderate	Critical	Severe
101 Fish Park1/	1,141	726	1,809	172	15	3,863	1,141	726	1,809	172	15
106 East Tom's Canyon		1,136	1,553	833	266	3,788		2,272	417	833	266
201 Davis1/		4,121	2,029			6,150		4,121	2,029		
301 Gibbler		3,601	22,506	18,905		45,012		14,854	22,506	7,652	
302 Wagon Park			17,890	13,495		31,385			31,385		
501 Big Salt1/		7,180	18,378	330		25,888		7,180	18,378	330	
509 Mt. Garfield1/		2,470	20,000	510	4,270	27,250		2,470	20,000	510	4,270
602 East Salt		32,343	59,074	2,919	51	94,387		52,511	39,879	1,946	51
704 Corcoran Wash1/	1,857	3,813	4,106			9,776	1,857	3,813	4,106		
713 Winter Flats		2,160	9,573	7,412	7,910	27,055		6,946	8,493	7,661	3,955
801 Sunnyside1/		2,295	5,108			7,403		2,295	5,108		
TOTALS	2,998	59,845	162,026	44,576	12,512	281,957	2,998	97,188	154,110	19,104	8,557

1/ Soil surface factors are predicted to decrease (improve) by an average of five points on these allotments, but the change was not enough to alter erosion condition class ratings.

TABLE 8-4

IMPACTS ON SOILS
NO ACTION

Erosion Condition Classes	Acreage in each Class	
	Present	Predicted[1/]
Stable	41,879	41,879
Slight	234,233	251,408
Moderate	560,633	571,912
Critical	256,294	231,795
Severe	28,608	24,653
TOTALS	1,121,647	1,121,647

NOTE: Does not include 88 less intensively managed allotments due to data gaps in three of the eight planning units. The two no grazing allotments are included.

1/ See appendix 3 for methodology used in predicting impacts.

5 existing AMPs and the 88 less intensive management allotments would not change hydrologically since the range trend is largely static. The rest of the allotments would either not change hydrologically or would continue to increase in runoff and sediment yield at their present rate, depending on vegetation trends. Changes in salinity would not be measurable at Imperial Dam because increased runoff would occur on both highly saline and slightly or nonsaline soils.

Wildlife

TERRESTRIAL WILDLIFE

Five of the eleven existing AMPs presently being implemented lie within deer and elk winter concentration areas. These five allotments comprise 117,005 acres. Four of these five, which comprise 109,602 acres, are showing gains in vegetation.

Cool season grasses are improving on the four allotments. This would increase birth success as pregnant animals used the high protein forage before leaving the concentration areas. The vigor and production of livestock-preferred browse species would also improve during years of deferred or complete livestock rest. These livestock-preferred browse species are often the highest preferred wildlife browse species also, although the highly preferred browse species often provide only a small portion of the total winter forage needs. The benefit of increased production would be partially offset in those pastures used during the fall or winter, when livestock utilization may increase over present levels.

As vegetation deteriorated on some of the 78 allotments proposed in chapter 1 for intensive AMPs, particularly on presently overused areas, and as mule deer and elk populations continued to increase, competition for forage would increase. This would result in increased winter mortality, decreased vitality, higher rates of abortion, and the birth of young in a weakened state. The ultimate effect would be deer and elk populations stabilizing at a lower level.

The effects on the 88 less intensive management and 2 elimination of grazing allotments would be similar to those described for the proposed action.

Overall, the no action alternative would result in wildlife forage improving on 109,602 acres, or about 9 percent, of the 1,200,857 public land acres in the ES area. The remaining 91 percent would remain the same or decline in mule deer and elk forage production as a result of livestock grazing.

The total population of small mammals, birds, reptiles, arthropods and the larger predatory mammals and birds which prey on them is a function of the vegetation production on the area. The total population of these groups would increase on the 6 existing AMP areas showing improvement but would decrease, or at best remain stable, on all other allotments. Changes in animal species composition and diversity would occur as vegetation composition and density and structure occurred.

AQUATIC AND RIPARIAN WILDLIFE HABITAT

The six existing AMPs showing improvement contain only a small portion of the aquatic and riparian habitat in the ES area. Riparian vegetation would improve to some extent in these areas, but, as discussed for the proposed action (see chapter 3), riparian vegetation would not fully recover under any of the proposed grazing systems. The majority of riparian and essentially all aquatic habitat would remain unchanged or continue to deteriorate under the no action alternative.

Threatened and Endangered Species

There would not be any impacts to the threatened or endangered species or their critical habitat.

Livestock Grazing

The present level of 94,822 AUMs of active qualifications for all allotments would remain unchanged under this alternative. The 88 areas proposed in chapter 1 for less intensive management would continue with the present situation. The existing fair or good range condition and vegetation on these 88 allotments would remain static or improve slightly, but no improvement in livestock quality or production is expected.

The remaining allotments would also continue under present livestock grazing practices and pressures. Areas presently receiving heavy grazing use would continue to deteriorate. Poor livestock distribution would continue to result in underutilization of areas presently receiving limited use due to insufficient water sources and livestock control facilities. No improvement in livestock grazing conditions is expected to occur.

Although stocking levels would remain at the present level, the overall general impact on livestock grazing would be a general decline in livestock grazing conditions and an associated unquantifiable decline in livestock quality and production. This would be a long-term, minor adverse impact on livestock grazing.

Socioeconomic Conditions

Adoption of this alternative would not change ongoing population trends, income or employment patterns, the tax base, or social well-being within the ES area.

Social and cultural attitudes could be adversely impacted since, as indicated in chapter 2, there is strong support in the ES area for developments that would facilitate economic growth and orderly development of the region. A strong attachment to traditional land uses, such as livestock grazing, is held by many area residents. Among those involved in the livestock sector, there appears to be strong support for installing range improvements which would facilitate domestic livestock use of public lands. Adoption of this alternative would conflict with each of the three items outlined above.

Visual Resources

Visual impacts would continue to occur on the three fully implemented AMPs, where vegetation manipulation treatments and range facility projects have been completed. The permanent and interim grazing systems set up on all 11 existing AMPs would result in a contrast between grazed and rested pastures. Impacts would not occur on any of the other allotments.

Recreation

Impacts arising from vegetation manipulations and range facilities on the 3 fully implemented existing AMPs would be similar to those described for the 78 intensive management AMPs in chapter 3, though they would occur on a much smaller scale. An increase in wildlife hunting and sightseeing could occur on the six allotments with existing AMPs where favorable vegetation responses are expected. However, overall increases in wildlife numbers would be very slight with this alternative, so impacts to hunting and sightseeing would be negligible areawide.

Wildland Areas

The 80-acre thinning and range facilities in the proposed action would not be implemented under this alternative. There would therefore be no adverse impacts.

Air Quality

Air quality would improve over the six existing AMPs which are showing improvement and would remain static over the other five. It would remain static or decline over the 78 allotments proposed for intensive management (chapter 1). Over the 88 less intensive management and two elimination of grazing allotments, air quality would remain essentially unchanged.

Cultural Resources

Vandalism and inadvertent damage would remain about the same as they are at present since no new range facilities would be constructed. The expected increases in erosion with this alternative could adversely impact cultural resource sites.

ALTERNATIVE B: CONTINUATION OF PRESENT GRAZING MANAGEMENT

This alternative proposes no change in present practices. With this alternative, BLM's existing management program and policies would be continued. In order to comply with the Federal Land Policy and Management Act (FLPMA), adjustments in grazing levels would be administered as the need is identified. All AMPs (except the 11 existing AMPS) would involve less intensive management; they would designate only the season of livestock use, class of livestock, number of AUMs allowed on the allotments, and any other stipulations desired by the Secretary.

Under this alternative, all eleven existing AMPs would continue to be intensively managed. The eight existing AMPs not fully implemented would continue to have proposed facilities constructed as funds and manpower became available until full implementation was achieved. These eleven AMPs would be modified in the future as necessary to meet objectives specified in the plans. The 78 allotments proposed for intensive management in chapter 1 would be under less intensive management, with AMPs designating only the season of use, class of livestock, and number of AUMs. The 88 less intensively managed allotments and two elimination of grazing areas would be managed as described in the proposed action.

Prior to implementation of AMPs, a range survey would be conducted, where necessary, to determine the present level of range forage production and the proper level of livestock use allowable. Livestock levels would then be adjusted, if necessary; it is anticipated that stocking levels would be reduced from the present level of 94,822 AUMs to 82,139 AUMs. An environmental assessment record (EAR) would be prepared in each instance where adjustments occurred. Table 8-1 shows the initial stocking levels, which are based on presently available data.

Impact Analysis

Vegetation

Between 1967 and 1975, eleven intensive AMPs were developed and approved for implementation. The allotments for which the AMPs were developed cover 281,957 acres of public lands and involve 23,681 AUMs of livestock production. Presently, three of the AMPs have been fully implemented, seven AMPs are partially implemented, and one has not been implemented. Lack of manpower and funds have prevented full implementation of all the AMPs and continued analysis of their range condition and trend. Analysis of available photographs and plot data of condition and trend transects indicates that plant vigor, production, species composition, and density is improving and that trend is up on two of the fully implemented and four of the partially implemented AMPs. The range trend on the five remaining allotments is static. This information indicates that once full implementation was attained under this alternative, increases in vegetation production on all eleven allotments would be achieved.

The 88 less intensive management allotments, which comprise 79,210 acres, and two elimination of grazing areas, which cover 15,887 acres, would be managed as described in the proposed action. Therefore, impacts on vegetation in these areas would be the same as those described in chapter 3.

The 33 allotments which would receive reductions in livestock use under the proposed action would receive identical reductions under this alternative. The levels proposed on these areas would be the optimum level for providing livestock forage while still allowing the key forage species an opportunity to complete growth and reproduction. Since range facilities would not be constructed, some areas which have historically been favorite grazing locations would continue to receive heavy grazing pressure. These areas consist of preferred locations along stream bottoms and adjacent to available water sources, where livestock have a tendency to congregate. Although the number of AUMs to be removed from these areas is subject to change with a range survey, presently available data indicates a decrease of 12,683 AUMs is possible (table 8-1). Vegetation would respond to reduced levels of use, showing increased vigor, production, species composition, and ground cover. Range condition would thus improve.

Of the aforementioned 33 allotments, those receiving the greatest reductions would show the greatest response in the short term. Depending on future grazing practices and pressures, the remaining 45 AMP areas would be expected to improve slightly or remain in their present condition. Those areas of allotments above the 14-inch precipitation zone (435,545 acres) would be expected to show the greatest increase in range vegetation condition over the present situation. Areas below the 14-inch precipitation zone (670,215 acres) would also show a positive response, but a longer period of time would be required.

The improvements described above would not be expected to occur immediately. Since this alternative is closely tied to present grazing management, it is not known when full implementation of existing AMPs would be achieved or reductions in stocking levels imposed. Therefore, livestock forage is expected to continue to decline until the actions proposed under this alternative are accomplished. Livestock forage production is then expected to increase but is not expected to increase over present livestock forage produciton by 2000. On the other hand, range condition is expected to show improvement by 2000.

Table 8-5 portrays the anticipated overall impacts to vegetation arising out of Alternative B.

Threatened and Endangered Plants (Proposed)

Present grazing systems could affect threatened and endangered plants in the future. Weedy species could increase by 2000, while other species which are unable to withstand grazing pressures could disappear. However, until the phenology and response to grazing is known for each threatened and endangered species, a definitive statement regarding the future environment cannot be made.

Soils

Since range trend would be upward for the eleven existing AMPs, litter accumulation and organic matter content in surface soils would increase. This, in turn, would improve soil structure, infiltration, permeability, porosity, and soil productivity. Since soil properties would improve, soil erosion would decrease. This reduction in erosion would be reflected in the erosion condition classes (SSFs). Table 8-6 shows the comparison between the present and future erosion condition classes for the eleven existing AMPS.

Of the 78 allotments proposed for intensive management in chapter 1, 33 would show an upward range trend. Soil properties and erosion rates would improve on these areas, given increases in vigor, production, and ground cover.

For the remaining 45 allotments where range condition is expected to remain static, no change in soil properties or erosion is expected. Erosion condition classes would be identical to those shown in chapter 2.

Impacts to soils for the 88 less intensively managed areas and two elimination of grazing areas would be identical to those arising out of the proposed action; see chapter 3.

Table 8-7 portrays the expected overall impacts of alternative B on erosion condition classes.

Water Resources

For this alternative, the 11 allotments with existing AMPs would respond in the same manner as the 78 intensive management AMPs would under the proposal (see chapter 3). The less intensively managed allotments would not change with respect to present runoff and sediment yield because present ground cover is expected to remain essentially unchanged. The 33 allotments to receive reduced stocking levels would show slight decreases in sediment yield and runoff by 2000 due to the positive

TABLE 8-5

IMPACTS ON VEGETATION
CONTINUATION OF PRESENT MANAGEMENT

	Present1/	Predicted1/
Range Condition2/(ac.)		
Good	216,885	273,358
Fair	566,403	541,476
Poor	417,569	386,023
Production (AUMs)	109,705	109,705

NOTE: Data encompasses all public land acreage.

1/ Methodologies used to determine present and predicted range condition and production are located in appendix 3.

2/ Range condition refers to forage, not ecological, condition.

TABLE 8-6

EROSION CONDITION CLASSES OF ELEVEN EXISTING AMPs WITH CONTINUATION OF PRESENT GRAZING MANAGEMENT

Allotment Name and No.	Present Erosion Condition Class (Acres)						Future Erosion Condition Class (Acres)				
	Stable	Slight	Moderate	Critical	Severe	Total Acres	Stable	Slight	Moderate	Critical	Severe
101 Fish Park[1]	1,141	726	1,809	172	15	3,863	1,141	726	1,809	172	15
106 East Tom's Canyon		1,136	1,553	833	266	3,788		2,272	417	833	266
201 Davis[1]		4,121	2,029			6,150		4,121	2,029		
301 Gibbler		3,601	22,506	18,905		45,012		14,854	22,506	7,652	
302 Wagon Park			17,890	13,495		31,385			31,385		
501 Big Salt[1]		7,180	18,378	330		25,888		7,180	18,378	330	
509 Mt. Garfield[1]		2,470	20,000	510	4,270	27,250		2,470	20,000	510	4,270
602 East Salt		32,343	59,074	2,919	51	94,387		52,511	39,879	1,946	51
704 Corcoran Wash[1]	1,857	3,813	4,106			9,776	1,857	3,813	4,106		
713 Winter Flats		2,160	9,573	7,412	7,910	27,055		6,946	8,493	7,661	3,955
801 Sunnyside[1]		2,295	5,108			7,403		2,295	5,108		
TOTALS	2,998	59,845	162,026	44,576	12,512	281,957	2,998	97,188	154,110	19,104	8,557

[1] Soil surface factors are predicted to decrease (improve) by an average of five points on these allotments, but the change was not enough to alter erosion condition class ratings.

TABLE 8-7

IMPACTS ON SOILS
CONTINUATION OF PRESENT MANAGEMENT

Erosion Condition Classes	Acreage in each Class	
	Present	Predicted[1/]
Stable	41,879	43,388
Slight	234,233	282,816
Moderate	560,633	552,405
Critical	256,294	218,385
Severe	28,608	24,653
TOTALS	1,121,647	1,121,647

NOTE: Does not include 88 less intensively managed allotments due to data gaps in three of the eight planning units. The two no grazing allotments are included.

[1/] See appendix 3 for methodology used in predicting impacts.

vegetation response. Since runoff would be slightly decreased on 202,259 acres of highly saline soil and 285,896 acres of moderately or nonsaline soils, the salinity at Imperial Dam would not be expected to show any measurable change.

The 45 remaining allotments would not change hydrologically. There is no change expected in ground water or ground water quality.

Wildlife

TERRESTRIAL WILDLIFE

Table 8-8 lists the impacts on wildlife associated with present allotments and seasons of use. Five of the existing eleven AMPs lie within deer and elk winter concentration areas. Wildlife would benefit from total implementation of all eleven AMPs as vegetation increased in quantity and quality. A estimated increase of 291 deer (due to 20 percent of total public land acreage being under intensive management) and 8 elk (a disproportionate share of elk winter range is included in the 11 AMPs) would occur on these allotments.

Reducing livestock use on 33 allotments would have an immediate beneficial impact on available forage for deer and elk by reducing competition. On the more favorable areas for livestock grazing, the situation would change little, since these areas are utilized first regardless of how many livestock AUMs are consumed. Hence, these historically overgrazed areas would continue to deteriorate. On the remaining 45 allotments and 88 less intensively managed allotments, little or no change is expected in deer and elk forage conditions.

The vegetative improvement on 11 AMP areas and reduced livestock use on 33 allotments would increase food and cover for small rodents, birds, and reptiles, which would, in turn, support greater numbers of predator mammals and birds.

Little change in animal populations would occur on the 45 allotments with no stocking reductions and the 88 allotments under less intensive management.

AQUATIC AND RIPARIAN WILDLIFE HABITAT

Aquatic and riparian wildlife habitat would respond as detailed for the 78 intensive management AMPs in chapter 3 on the eleven existing AMPs, though on a smaller scale. Sedimentation would not change on the 88 less intensively managed allotments and 45 other allotments not receiving stocking reductions. It would decrease slightly on the 33 allotments with stocking reductions.

The most important impact would arise from the lack of livestock control with this alternative. Livestock would continue to concentrate in and overgraze riparian and aquatic habitat.

Threatened and Endangered Species

The impact would be the same as for the No Action Alternative.

Livestock Grazing

This alternative would reduce active qualifications from 94,822 AUMs (compiled from individual operator case files) to 82,139 AUMs, a decrease of 12,683 AUMs. The reductions would involve 33 of the proposed 78 AMP areas and two elimination of grazing areas and affect 38 livestock operators, two of whom would be impacted by both a stocking reduction and the elimination of grazing on the no grazing areas.

The 29 percent decrease in the 38 operators' active qualifications, 43,904 AUMs to 31,221 AUMs, would lower the value of their base property, to which the federal grazing privileges are attached. These livestock operators would become more dependent on other lands until forage production increases are realized on the 33 allotments. Depending on individual allotment responses, production increases may not be realized until after the year 2000. If other lands the operators own, rent, or lease were not capable of supporting the 12,683 AUMs removed from public lands, some operators would probably have to buy, rent, or lease additional pasturage or sell some of their livestock.

Available data indicates that the remaining 45 proposed allotments, 11 existing AMPs, and 88 less intensively managed allotments would receive no reductions in livestock use.

Present grazing practices would be retained, with some changes occurring in season of use and class of livestock. Poor livestock distribution due to insufficient livestock water sources and control facilities (fence, cattleguards, etc.), would continue to result in underutilization of some areas and overutilization of favored livestock concentration areas.

The loss of the two aforementioned elimination of grazing areas, Sewemup Mesa and the 885 acres of the GML Allotment along the Dolores River, would have only a slight impact on livestock grazing. The Dolores River area involves the loss of 1 AUM and Sewemup Mesa the loss of 24 AUMs, resulting in a total reduction of 25 AUMs of active qualifications.

The overall impact on livestock grazing would be a loss of 12,683 AUMs, an adverse impact to 38 livestock operators. In addition, there would be an unquantifiable increase in livestock quality (weight gains) on those areas expected to show improvement in range condition (see Vegetation section).

TABLE 8-8

IMPACTS ON WILDLIFE

CONTINUATION OF PRESENT MANAGEMENT

Allotment No. & Name		Grazing System or Season of Use	Impacts
	Existing AMPs	Rest Rotation (3,5,6,7 treatments)	
101 Fish Park 3RR1/ 201 Davis 3RR 301 Gibbler 6RR 302 Wagon Park 3RR 501 Big Salt 6RR 509 Mt. Garfield 3RR 602 East Salt 5RR	704 Corcoran Wash 5RR 713 Winter Flats/ Deer Park 7RR 801 Sunnyside 3RR	Utilize forage in spring. Utilize forage in summer. Utilize forage in fall or winter. Rest from grazing yearlong. All forage available for wildlife.	Competition between all grazing species and livestock. Reduced winter forage. Reduced winter forage. Competition with livestock, especially between sheep and deer.
	Existing AMP	Deferred Rotation (3 treatments)	
106 East Toms Canyon 3DR1/		Utilize forage in spring. Utilize forage in fall or winter after growing season.	Competition between all grazing species and livestock. Defer: Forage available for wildlife. Graze: Reduced winter forage.
122 Clarks Bench 127 Duval 141 Burke 142 Colorado River 143 Radio Tower 161 Coates Creek 304 Woodring 610 Maluy 706 Burdick E. of Ranch 710 Conn Creek 715 Dry Fork	734 Logan Wash Common 739 McCurdy Wash 747 Tater Hills 752 West Logan Wash 755 4A Individual 807 Spring Creek to Coon Cr. 808 White Mountain Common 809 Wild Country 843 Big Park 847 Jerry Gulch	Spring Grazing	Competition between all grazing wildlife species and livestock. Possible regrowth for wildlife use if livestock removed early enough.
103 Haystack 113 Fessler 115 Spring Creek 129 Snyder Flats 148 Thompson 156 NE Creek 419 Hubbard	424 Bergis North Mesa 506 Lapham Canyon 721 Head of Carr Creek 723 Henderson Ridge 725 4A Mountain 738 Lower 4A Ridge 844 Lower Rapid/Cottonwood	Spring and Summer Grazing	Competition between all grazing wildlife species and livestock. Reduced winter forage.

TABLE 8-8 (Continued)

IMPACTS ON WILDLIFE

CONTINUATION OF PRESENT MANAGEMENT

Allotment No. & Name		Grazing System or Season of Use	Impacts
109 Longshore Below Rim 111 McKenzie 137 Timber Ridge 145 Palisade Point 166 Hill Creek Flats 402 Bulldraw Common 403 Dugway 407 Bull Hill Maverick 607 Sphinx-Mitchell	703 Brink Pedigo Gulch 712 Coon Hollow 714 Doughtery Gulch 718 East Spears Common 727 Ind. E. of Ranch 737 Lower Roan Cr. Common 745 Round Mountain 748 Upper Brush Mtn.	Spring - Fall Grazing	Competition between all grazing wildlife species. Reduced forage for winter. Possible regrowth for wildlife if livestock removed early enough in spring.
116 Bangs 117 Files 123 Upper Bench 126 28 Hole 130 Colorado Ridge 133 Reservation 136 Knowles 138 Black Ridge 152 Round Knob 154 Lost Canyon 157 Boulder Canyon 163 West. Tom's Cyn. 164 Fish Canyon 165 Beezer	401 Palisade Flats 406 Blue Mesa 408 Casto Lines 411 Dolores River 414 Bull Canyon 416 North Creek 433 Hamilton 507 Little Salt 604 Crow Bottom 608 Dry Canyon-Demaree 613 Rabbit Valley 702 Berry Homestead 733 Logan Gulch 839 South Beaver Mesa	Spring and Winter	Competition between all grazing wildlife species. Possible regrowth for wildlife if livestock removed early enough in spring. Winter use results in less forage available for wildlife in winter.
121 Notch Spring 502 Coal Gulch-Roan Cr. 505 Buniger 606 Corral Canyon Mtn. 616 Prairie Canyon/ Johns Canyon 722 Carbon 724 Kimball Creek	729 Kimball Mtn. 732 Logan End Common 742 Paddock 744 Roan Creek Common 747 Tater Hills 749 Walker	Spring, Summer, and Fall	Competition between all grazing wildlife species. Reduction of winter forage for wildlife.
105 South of the Road 202 Kannah Creek Common 203 Whitewater Common 405 Wright Draw 409 Sinbad Valley Comm. 410 Ute Creek Common	420 GML 429 Dolores Point 503 Garr Mesa 504 Hunter Wash 612 Baker-Bitter Cr.	Spring, Fall, and Winter	Competition between all grazing species and livestock. Possibly regrowth for wildlife if livestock removed early enough in spring. Winter-fall use results in decreased forage

TABLE 8-8 (Continued)

IMPACTS ON WILDLIFE

CONTINUATION OF PRESENT MANAGEMENT

Allotment No. & Name		Grazing System or Season of Use	Impacts
			available to wildlife.
108 Longshore Above Rim 150 Meinhart 705 Brush Mtn. Common 716 East End Cow Mtn.	726 Horse Mountain 741 Middle Cow Ridge 751 West Cow Mtn. 840 Dakota Rock	Summer	Reduction of winter forage available for wildlife.
158 Ladder Canyon		Summer and Fall	Reduction of winter forage available for wildlife.
404 Beaver Mesa		Fall	Reduction of winter forage available for wildlife.
119 Deadhorse 120 Landini 125 Lower Bench 135 Little Dolores Bench 413 Ames 508 Mogenson	601 Badger Wash 754 Whittaker Flats 811 Lyons 812 Anderson 848 Sugar Bench	Winter	Defer: All forage available for wildlife during critical spring green-up. Graze: Reduced winter forage for wildlife; competition between species, especially between sheep and deer, and cattle and elk.
603 West Salt Common		Yearlong	Competition between all grazing species and livestock. Reduced winter forage.

NOTE: A 13.4% reduction in AUMs would reduce competition somewhat compared to the present system. As a result, vegetation would improve slightly. However, without intensive livestock management, the impacts listed are expected to occur.

1/ RR = rest rotation; DR = deferred rotation

Socioeconomic Conditions

INCOME

Ongoing trends for contract construction-related, government-related, and recreation-related income would not be altered by adoption of this alternative.

Range livestock-related income would be affected with an immediate reduction resulting from reduced grazing on 33 allotments. The income changes resulting from adoption of this alternative would be the same as those indicated for the 38 ranches in table 3-18. The possibility of BLM forage use being returned to the ranches in the long term, as indicated for the proposed action, does not apply in the case of this alternative. Therefore, range livestock related income impacts for this alternative, for both the short and long term, would be indentical to those in chapter 3 for the short term. Relative dependency of these ranches on BLM grazing and the criticality of that dependency are indicated in tables 8-9 and 8-10.

It is estimated that livestock ranching is the primary source of income for 28 of the 40 families.

EMPLOYMENT

Ongoing trends for contract construction, recreation, and government-related employment would not be affected. The employment impact on the range livestock sector would be the same as indicated in chapter 3 for the proposed action. An estimated 10.52 man years of hired ranch employment would be lost.

PUBLIC FINANCE AND TAX BASE

As indicated in a previous section, there would be a decrease in allowable AUMs (active use qualifications) from the presently licensed level of 94,822 to 82,139. The decrease of 12,683 AUMs allowable use would represent a decrease having economic value to the 38 ranches associated with the use decreases. Therefore, the relative value of such ranches and of the ES area tax base would be decreased.

A decrease of 12,683 AUMs would translate into a decrease of 1,054.92 animal units of allowable use, which would decrease the present value of the affected ranches by about $1,054,920. This decrease, although possible only a paper loss, would be felt by the ranch owners.

A related decrease would involve the tax base. It is possible that changes in ranch value would now be assessed at about five percent of market value. This would mean that decreased ranch values resulting from cuts in allowable use would result in a decrease in the tax base of about $52,746, or 0.025 percent of 1977 Mesa county assessed valuation (Colorado Department of Local Affairs 1977).

It should be noted that Colorado agricultural land prices reflect demand influences for land which involve considerations other than future ranch income. Therefore, the likelihood that ES area ranch property would appreciate is acknowledged. However, values or ranch property with decreased present value as a result of the proposal might be expected to increase at a slower rate than similar properties experiencing no decrease in allowable use.

Property taxes paid to local governments would decrease by an estimated $4,368 as a result of herd reductions on impacted ranches (appendix 12).

SOCIAL WELL-BEING

There would be an adverse impact on the social well-being of 40 ranching families due to expected income losses. The possibility exists that, as a result of these income losses, some operations could go out of business. In addition, some occupational dislocations could occur if some operators were forced out of business. There would be paper losses in the value of base properties associated with reductions.

Taken together, these considerations indicate a major impact for a small group of livestock operators and their families in the ES area, though the impact on the overall social structure would be negligible.

Social and Cultural Attitudes

The reduced public land use for range livestock grazing would conflict with attitudes and values held by the ranching community in the ES area. For example, they consider livestock grazing a justifiable, traditional land use. Those directly impacted by the reductions could feel themselves deprived of the opportunity to pursue what they consider to be a hard-working, independent existence.

Visual Resources

Impacts on the 11 existing AMPs would be similar in nature to those occurring on the 78 proposed intensive management AMPs (see chapter 3), though the magnitude would be considerably less. No other impacts would occur.

Recreation

Impacts on the 11 existing AMPs would be similar in nature to those described for the 78 intensively managed allotments in chapter 3, though they would occur on a much smaller scale. Increases in wildlife numbers due to favorable vegetation response on 44 allotments could lead to increased hunting and sightseeing.

TABLE 8-9

OPERATOR/RANCH DEPENDENCY ON BLM GRAZING CONTINUATION OF PRESENT MANAGEMENT

% Dependency	Number of Ranches
0 to 10	10
11 to 20	9
21 to 30	11
31 to 40	4
41 to 50	1
51 to 60	1
61 to 70	0
71 to 80	0
81 to 90	1
91 to 100	1
	38

TABLE 8-10

CRITICALITY OF OPERATOR/RANCH DEPENDENCY ON BLM GRAZING
CONTINUATION OF PRESENT MANAGEMENT

Criticality	Number of Ranches	% of Total
High	21	55.3
Medium	12	32.6
Low	5	13.1
Total	38	100

NOTE: High means that BLM forage use is judged to be an essential element for the survival of the ranching operation. Medium means that BLM forage use may or may not be an essential survival element. Low means that BLM forage use is judged to not be essential to the ranching operation survival.

A judgmental estimate of the criticality of rancher dependency on public land grazing was made by BLM personnel by applying the following three criteria to each ranching operation:

1. Proportion of forage acquired on public land.

2. Season that forage is acquired.

3. Ease in acquiring alternate sources of forage.

Wildland Areas

The 80-acre thinning and range facilities in the proposed action would not be implemented under this alternative. There would therefore be no adverse impacts.

Air Quality

Air quality would improve over the 11 existing AMPs by the year 2000. The 33 allotments experiencing stocking reductions would also show improvement, while the remaining 45 AMP areas would remain the same. Air quality over the 88 less intensive management allotments and two elimination of grazing areas would remain essentially unchanged.

Cultural Resources

Impacts on the 11 existing AMPs would be similar in nature to those occurring on the 78 intensive management AMPs under the proposal (see chapter 3), with vandalism and inadvertent damage occurring during completion of the 8 partially implemented AMPs. Vandalism and inadvertent damage would remain about the same as they are at present over the rest of the ES area. The favorable vegetation responses would help to prevent erosion damage.

ALTERNATIVE C: ELIMINATION OF GRAZING

This alternative proposes the elimination of livestock grazing on public lands. New range facilities would not be permitted; however, existing facilities which enhance wildlife or recreation values would be maintained for these resources. Public lands would be managed for resource values other than livestock grazing.

Livestock operators would have to move to other public lands or confine their livestock to their privately owned or other leased lands. Approximately 2,807 miles of fence would have to be constructed by livestock operators to segregate all private lands from adjoining public lands.

Impact Analysis

Vegetation

Complete elimination of grazing on public lands would result in a change in composition of vegetation cover. It can be assumed that "natural" succession would result in a climax plant community, e.g., Big sagebrush (20 percent)/western wheatgrass (50 percent) (SCS Range Site 289 Clayey Foothills), over a period of years. Grass would be favored on most sites, especially on allotments formerly grazed with cattle or horses.

Annual plant production would increase slowly at first, then rapidly, following the classic S-shaped growth curves of individual species of plants (Varley et al. 1974). In a study by McLean and Tisdale (1972) in British Columbia in rough fescue and ponderosa pine zones, it took up to 40 years for range in poor condition to recover to good when protected from livestock grazing. The recovery from fair to good condition was more rapid (about 20 years). Little change in plant composition took place inside the exclosures in less than 10 years following fencing. This study took place in an annual precipitation zone of about 25 inches, in rough fescue and pine-bunchgrass vegetative types.

Most of the ES area is in annual precipitation zones around 10 to 16 inches. The lower zones of the conifer type, which in the ES area corresponds to the study area's vegetation types, is at the upper elevations of the area and receives an average of 18 to 20 inches of precipitation annually (average annual temperature is cooler than that of the British Columbia sites).

Appendix 3 gives the methodology used to determine the expected vegetation response with the elimination of grazing alternative. Precipitation and the present range condition were the parameters considered.

This alternative would result in an overall initial improvement in range conditon by 2000 and beyond. Annual production would begin to stabilize well after the year 2000 as it reached the high point of the growth curve (Kershaw 1973). As peak production was reached and the plant community stabilized, a slight decrease in annual forage yield and litter accumulation could be expected. The time frame for this is impossible to ascertain, given variations between individual allotments. The greatest improvement under this alternative would be on those areas now grazed during the spring, summer, or early fall. However, improvement would not be measurably more rapid under this alternative than it would be for the 78 intensively managed allotments under the proposed action.

The absence of both the stimulus to plant tillering provided by moderate defoliation and the favoritism provided to preferred species by the grazing plans would not be wholly beneficial (Hormay 1970). Reardon and Merrill (1976) found on the Edwards Plateau in Texas that forage yields, litter accumulation, and decreaser and increaser plant species were lower on natural areas than on areas under deferred rotation and light grazing.

Ellison (1960) noted that several studies witnessed comparable rates of range improvement between ranges under elimination of grazing and those being lightly to moderately grazed. He tried to reconcile this with the observed inhibition of plant growth by clipping. Apparently, two opposing plant tendencies were operating, vegetative and reproductive plant growth. If vegetative growth were encouraged by light to moderate grazing, perennial plants, which most desirable plants are, would have advantages over shorter-lived species, which typically depend more on seed production for their maintenance in the plant community. Ellison concluded that lack of precision in range analysis and unknown plant physiological factors may also be responsible for the observed similarity between ungrazed and light to moderately grazed ranges.

The 88 less intensively managed allotments would respond faster under elimination of grazing than under the proposed action, especially on those areas located in or above the 14-inch precipitation zone (36,213 acres). Virtually all of these acreages (6.5 percent of total public land) would improve in range condition.

Approximately 2,807 miles of boundary fence would be required to separate private and public lands to prevent livestock trespass. This would disturb approximately 3,400 acres of vegetation; approximately 7 acres would be permanently removed from production.

Table 8-11 shows the expected impacts on vegetation for this alternative.

Threatened and Endangered Plants (Proposed)

The possibility of proposed threatened and endangered plants being trampled and eaten would be reduced if livestock were removed from range. Wildlife, however, could still trample and graze these plants. Most plants should flourish and increase in number.

Soils

Ground cover would increase through the first twenty years under the elimination of grazing alternative and then gradually stabilize with time (Reardon and Merrill 1976 and Dahl et al. 1976). The Badger Wash study (USGS 1978), which was carried out in the western part of the ES area from 1953 to 1973, showed increased ground cover when livestock grazing was eliminated. Differences between measurements made on grazed and ungrazed areas during this study were not large; they generally ranged from 1 to 6 percent. By 2000, ground cover would exceed that which exists today by an unquantifiable amount.

With an increase in ground cover, soil infiltration, permeability, structure, and productivity would improve. These soil properties would improve with increased root penetration and litter deposition, as they would with the proposed action. Infiltration would generally improve to a greater extent than it would with livestock grazing because of complete relief from compaction due to livestock trampling. However, infiltration would not improve as much on desert ranges as it would with livestock grazing because of the absence of soil pitting by the action of hooves, which permits the entrapment of surface runoff (Howell 1978).

Soil erosion rates would be substantially less than those which exist at present. Table 8-12 quantifies the anticipated overall impacts on erosion condition classes.

Resource uses other than livestock grazing on public lands may or may not be more beneficial to soils. It would depend upon the intensity, timing, and duration of resource use. Resource uses which would create the largest amount of soil disturbance would also create the greatest adverse impact to the soil resource.

Water Resources

Complete elimination of grazing would allow infiltration rates to recover to near-pristine conditions over a period of four or more years, depending upon the soil characteristics. In addition, ground cover would increase by 2000 over the entire ES area. The combination of these two factors would result in decreased runoff and sediment yield for the entire ES area similar to the areas showing improvement in table 3-10, i.e., Lipan Wash, E. Salt Creek, Cone Mountain, Little Horsethief, and Pollock Canyon. Salinity would decrease at Imperial Dam by 0.049 milligrams per liter of total dissolved solids (TDS) which is considered immeasurable.

Wildlife

TERRESTRIAL WILDLIFE

Under this alternative, competition with livestock would be eliminated and all 94,822 AUMs would be available for wildlife. In the short term, wildlife populations would increase. However, even with these increases, only a portion of the 94,822 AUMs of additional forage would be utilized.

Elimination of grazing on big game winter concentration areas would increase AUMs available for wildlife; in effect, it would enlarge that portion of the range most limiting to big game populations. These population increases could be short-term in many cases.

Dasmann (1964) classifies mule deer, elk, antelope, and sage grouse as midsuccessional species whose habitat is generally created and maintained by disturbances such as lumbering, burning, and grazing. (Exceptions exist to the above; elk, for instance, would be favored by an increase in grass occurring in some climax communities, e.g., sagebrush and grassland types.) Since these animals are subclimax, they cannot be maintained permanently

TABLE 8-11

IMPACTS ON VEGETATION
ELIMINATION OF GRAZING

	Present[1/]	Predicted[1/]
Range Condition[2/] (ac.)		
Good	216,885	442,779
Fair	566,403	403,601
Poor	417,569	354,477
Production (AUMs)	109,705	121,409

NOTE: Data encompasses all public land acreage.

[1/] Methodologies used to determine present and predicted range condition and production are located in appendix 3.

[2/] Range condition refers to forage, not ecological, condition.

TABLE 8-12

IMPACTS ON SOILS
ELIMINATION OF GRAZING

Erosion Condition Classes	Acreage in each Class Present	Predicted[1]
Stable	41,879	53,142
Slight	234,233	442,835
Moderate	560,633	473,125
Critical	256,294	130,490
Severe	28,608	22,055
TOTALS	1,121,647	1,121,647

NOTE: Does not include 88 less intensively managed allotments due to data gaps in three of the eight planning units. The two no grazing allotments are included.

[1] See appendix 3 for methodology used in predicting impacts.

in an area unless their habitat is periodically disturbed. In much of the area, deer would become the only large herbivore. Since interspecific competition is much greater than intraspecific competition, continual selection of their preferred plants would soon begin to favor many plant species not preferred by deer. The ultimate effect would be nonpreferred plant species becoming dominant and outcompeting the more preferred plants, thus eventually reducing mule deer forage and the number of deer the area could support.

Prior to the advent of the white man, a mosaic of disturbed areas was maintained by fires caused primarily, but not exclusively, by lightning and primitive man (Komarek 1962, Komarek 1963, Phillips 1962, Miller 1963, Stewart 1963, and Regua 1964). In addition, prey numbers were held in dynamic equilibrium by a greater abundance of predators and the hunting pressure of aboriginal man. However, today, because of fire suppression, fire can no longer be relied on to create seral vegetation stages of sufficient number to maintain the historic diversity of wildlife. In addition, predator numbers are reduced (especially in the case of big game predators) so that they can no longer be relied upon to check prey populations.

It is expected that hunting seasons could be modified so as to keep wild populations within their carrying capacity. However, as vegetation proceeds to climax, species adapted to lower stages in vegetal succession are expected to decrease as the habitat becomes less and less suitable.

Instances where wildlife may be able to hold succession at a seral stage are to be expected where deer and elk occupy the range together. The preference of elk for grass would act to increase browse, while the preference of deer for browse would act to increase grass, particularly on summer ranges. On winter range, deer and elk browsing can overlap considerably. Furthermore, elk are stronger foragers than deer under winter conditions. If numbers were not closely controlled, deer could be outcompeted by elk. Other than where summer ranges of these two species overlap, range conditions are expected to proceed toward conditions less suitable to the grazing species.

Small mammal populations could also be expected to react to elimination of grazing. A California study in which livestock were excluded from an area of past heavy use demonstrated a vegetation recovery along with the gradual elimination of the California Ground Squirrel (Linsdale 1946). Another study demonstrated an affinity of various small mammals to seral or disturbed sites while others were more abundant in climax communities (Larrison & Johnson 1973). Generally, diversity of animal species is greatest shortly prior to climax and declines as climax is approached (Margalef 1958).

Little information is available on the effects of grazing versus no grazing on bird populations. Wiens and Dyer (1975) report that more breeding birds are apparent on ungrazed or lightly grazed sites than on heavily grazed sites. Grazing may also influence bird species composition. These changes are probably brought about through effects of grazing on vegetation structure and composition rather than directly on bird populations themselves. Overall, it is thought that elimination of grazing would bring about at least an initial increase in breeding bird populations. However, as vegetation becomes more uniform with the passage of time, bird diversity is expected to decrease.

The additional 2,807 miles of fence required to separate private lands from public as a result of this alternative would create a restriction to wildlife movements. As a result, it is estimated that 140 animals would die each year as a result of entanglements associated with attempts to negotiate these barriers.

AQUATIC AND RIPARIAN WILDLIFE HABITAT

Riparian and aquatic habitat on public land should return to near natural conditions by 2000. Vegetation consisting of riparian species would increase and become reestablished in most areas. The condition of these habitat types would improve markedly.

Decreased stream bank erosion would result in channel morphologies more suitable to fish (Gunderson 1968). As watershed condition improved, stream waters would carry less sediment and turbidity would decrease. Overhanging vegetation would lower water temperatures, and trout would be able to survive at lower elevations. After spring runoff flushes accumulated sediments from stream bed gravels, spawning may be possible in streams that historically supported fish populations before being exposed to heavy sediment loads. Increased abundances of terrestrial insects would be available in riparian vegetation, and the abundance and diversity of aquatic organisms would increase as new niches become available.

Riparian plant and bank succession, with no livestock grazing, could proceed to where the streams were again unsuited for sport fish production (Kennedy 1977). This condition would not generally prevail within 20 years under this alternative.

Sediment and turbidity carried in the larger rivers would decrease noticeably and these waters would become more suitable for clean water organisms. Aquatic invertebrates characteristic of clean water would increase and the number and condition of trout in suitable areas would increase slightly.

Threatened and Endangered Species

Increased song bird populations could increase the prey base for peregrines, although the existing prey bases are not considered limiting. Natural reproduction of cottonwoods would occur as mature trees died, assuring the continued availability of bald eagle perches along the major streams. Therefore, no adverse impacts are anticipated.

Livestock Grazing

Under the elimination of grazing alternative, all existing livestock use on public lands would be eliminated. All of the 140 operators presently utilizing BLM administered public lands for livestock grazing would be adversely impacted. Private lands presently owned or leased by these operators are generally not adequate to maintain their herds yearlong. With the elimination of grazing, these individuals would be forced to buy or lease other grazing lands or sell portions or all of their livestock. Operators with inadequate resources would ultimately be forced out of the livestock business.

Approximately 94,822 AUMs (active qualifications) of domestic livestock use per year would be lost. This loss would amount to an annual loss of approximately 7,902 animal units of livestock production in area herds. This represents a 8.9 percent reduction in animal units in the ES area when compared to the 1977 ES area estimated preliminary livestock inventory. While this reduction appears relatively small regionwide, these AUMs represent the support of a much larger percentage of the area's herds during certain portions of the year. In spring, for example, an operator's winter feed supplies could be exhausted and private and National Forest pastures might not be ready for grazing.

Without grazing on public lands, many breeding stock animals would have to be sold, even though most of their forage comes from private or National Forest sources. The reduction would come at a time when the demand for AUMs is expected to increase, thus forcing increased livestock production in other areas (private property and National Forest lands) or reductions in the per capita red meat supply.

Socioeconomic Conditions

POPULATION

The 142 families and 472 people associated with livestock grazing on public lands (see chapter 2) would be impacted. As indicated in the livestock grazing section, a portion of the 138 operators would be forced out of the livestock business, depending upon their inability to make the transition from public lands grazing. Some of these operators could be expected to relocate, which would present the possibility of a slight impact on the ES area population as they relocated themselves and their families.

INCOME

Information on the number of livestock ranching operators and their dependency situation is identical to the information displayed in chapter 2 (tables 2-19, 2-20, and 2-21). The income losses to the 138 operators/ranches and 142 families (some ES area ranches support more than 1 family) was calculated using the CSU study, as discussed in appendix 12. Table 8-13 indicates the expected changes in gross and net revenues for the different size and types of ranches as well as the aggregate impact on revenues. As indicated, gross revenue would be reduced by $4,764,031. This would result in a decrease of 3,811,224 sales by other sectors of the ES area economy as indicated by the business activity multiplier of 1.8.

Net revenue would be reduced by a total of $2,248,674. When the income multiplier of 1.6 is applied to this direct income reduciton, it indicated that an additional indirect income reduction of $1,349,204 would occur in the ES area. Thus the total direct plus indirect income effect would be a reduction of $3,597,878 which would be 1 percent of the 1976 Mesa County personal income.

The reduction in net revenues resulting from the loss of BLM forage use would mean that most of the 138 ranching operations would experience negative net reveunes. There would be a severe adverse impact on operators, forcing a recombining of properties as some operators sold their ranches and migrated to cities within the area or left the area completely.

There would be a positive short-term impact in contract construction income, since elimination of grazing would require extensive boundary fencing to prevent livestock trespass on public lands. Construction of approximately 2,807 miles of fencing would result in installation costs totaling $8,421,000 (at $3,000 per mile) and annual maintenance costs of about $168,420 (at 2 percent of initial cost). The cost of fencing and maintenance would be borne by the livestock ranchers, thus increasing their costs, which would have the effect of reducing their incomes even further. If ES area households captured 20 percent of initial installation costs, area income would increase by $1,684,200 during the installation phase. This amount would be spread over several years, so comparison with a yearly base period is not possible. If 30 percent of yearly maintenance costs were captured by ES area households, it would result in an ongoing yearly income increase of $50,526 after the installation phase. Thus, any income effects of this fencing

TABLE 8-13

RANCH SIZE AND INCOME EFFECTS

ELIMINATION OF GRAZING

Model	Cattle	Sheep	Number of Ranches	Total BLM AUM Reduction	Total Corresponding Private Land AUM Reduction	Total BLM plus Private AUM Reduction	Average AUM Reduction per Ranch	Gross Revenue Changes per Ranch	Gross Revenue Changes/All Ranches	Net Revenue Changes per Ranch	Net Revenue Changes/All Ranches
I	0 to 249		70	12,899	0	12,899	184	$ 10,654	$ 745,780	$- 4,808	$- 336,560
II	250 to 549		26	19,608	0	19,608	754	28,024	727,624	-14,637	- 380,562
III	550 to 749		11	16,756	0	16,756	1,523	91,145	1,002,595	-38,480	- 423,280
IV	750 or greater		14	28,525	0	28,525	2,038	135,513	1,897,182	-66,435	- 930,090
V	0 to 220	0 to 1000	6	3,817	0	3,817	636	14,239	85,434	- 9,354	- 56,124
VI	221 to 1300	650 to 5400	5	8,903	0	8,903	1,780	0	0	+ 3,282	+ 16,410
VII		500 to 1249	3	722	0	722	241	17,470	52,410	- 9,123	- 27,369
VIII		1250 or greater	3	3,592	0	3,592	1,197	84,002	252,006	-36,153	- 108,459
Total			138	94,822	0	94,822			$4,764,031		$-2,246,034

SOURCE: BLM Range Automated Data System, 1978, for ranch sizing.

NOTE: Income effects derived from analysis in appendix 12. Gross and Net revenue effects have been adjusted to compensate for the non fee payment on private AUMs. Private AUMs within allotments have been included in the ranch income analysis since their level of use changes proportionally with BLM AUMs.

captured by some ES area residents would be at the expense of the livestock operators.

Recreation-related income would remain relatively unaffected by this alternative.

Government income would be slightly impacted by the hiring of two or three additional BLM range use supervision employees on a year-round basis at an annual salary of about $12,000 each. Overhead expenses would total about $45,000 (this would include necessary helicopter lease time). These positions would be located in the ES area. After deductions from salaries are considered, the income multiplier would bring about an increase in area income of about the gross amount of the salaries. Approximately 20 percent of overhead expenses could also be expected to be returned as area income.

EMPLOYMENT

A loss of employment would occur in the livestock industry. The exact magnitude of the loss is difficult to determine since it would depend upon the manner in which properties were recombined or on alternative land use decisions by owners of affected properties. However, estimates are that 70.15 man years of hired ranch employment would be lost annually (appendix 12).

During the construction phase of boundary fencing, about 140 person-years of employment would occur ($12,000 income equals one person-year of employment). Maintenance after installation of fencing would likely generate about 4 person-years of employment annually.

An impact on employment due to recreation-related expenditures is not expected to occur. Government employment would be increased by two or three permanent positions.

The net effect would be a reduction in employment of about 64 man years after completion of necessary fencing.

PUBLIC FINANCE AND TAX BASE

As indicated in the livestock grazing section, there would be a loss of 94,822 AUMs allowable use (active use qualifications). There could be a slight impact on the area's funding capability. The loss of 94,822 AUMs allowable use would result in a loss of 7,902 animal units of carrying capacity for ES area ranches. This would mean an estimated decrease in the market value of affected base property ranches of about $7,902,000 which (at an estimated five percent of market value), would translate into a decrease in assessed valuation of about $395,100. In 1977 this amount accounted for 0.236 percent of the Mesa County assessed valuation of $207,422,150.

Actual reductions in the market value of area ranches might not be $7,902,000 due to appreciation of properties resulting from demands for land for other than livestock income purposes. However, the amount would be a paper loss directly affecting certain base ranch properties and would also have an impact on ES area tax revenue potential. Herd reductions on impacted ranches would result in a reduction of $29,121 in local property taxes paid (appendix 12).

SOCIAL WELL-BEING

Livestock operators would experience major adverse impacts, reducing the value of their property, reducing their incomes, and forcing upon them changes in life-style and community associations.

SOCIAL AND CULTURAL ATTITUDES

A considerable amount of resentment and antagonism could be expected by ranchers as a result of federally imposed elimination of grazing on public lands.

Adoption of this alternative would conflict with strong, locally held attachments to land and its traditional uses as well as with strong feelings of independence and individualism. Elimination of livestock grazing on public lands would also conflict with strong local support for properly controlled economic development and growth.

Visual Resources

Since there would be no grazing, vegetation manipulations, or range facilities, there would be no adverse impacts. The 2,807 miles of fence would not be discordant in any VRM class, assuming standard operating procedures in chapter 1 and specifications given in appendix 2 were followed. Due to positive vegetation response, there would be an improvement in the vegetation feature areawide. The quantity of vegetation would increase, but diversity could decrease if plant communities proceeded to climax.

Recreation

The 2,807 miles of fence required to keep livestock off public lands would be an inconvenience to hikers and hunters and a safety hazard to snowmobilers and motorcyclists. Increases in wildlife numbers, especially deer, would increase sightseeing and hunting opportunities. Absence of livestock would be considered a beneficial impact by some recreationists, but others would regret the loss of a portion of the traditional Western scenery.

Wildland Areas

The 80-acre thinning and range facilities in the proposed action would not be implemented under this alternative. There would therefore be no adverse impacts.

Air Quality

Total elimination of livestock grazing on all public lands would result in better vegetative ground cover over the entire ES area. There would be a corresponding decrease in windblown dust particles, resulting in an increase in air quality.

Cultural Resources

This alternative would eliminate the opportunity for livestock to trample and rub cultural sites on public lands within the ES area. Vandalism and inadvertent damage may be less of a problem than they are presently due to an absence of livestock operations. On the other hand, increased use of public land by recreationists could offset this. Decreases in erosion would be beneficial.

ALTERNATIVE D: WILDLIFE EFFECTIVE

This alternative proposes grazing program components that would favor wildlife objectives. Class, numbers of livestock, and season of use would be the primary items adjusted to achieve desired objectives. Stocking levels would be reduced from the present level of 94,822 AUMs to 67,578 AUMs.

The method of livestock management used to achieve wildlife objectives would be based upon big game species and seasons of wildlife use. Other large mammals, plus small mammals, birds, reptiles, amphibians, and invertebrates, would be generally benefited by the proposed action and are therefore not addressed in this alternative. In addition, the recreational value of big game species is greater and more is known about their habitat requirements and the management techniques needed.

AMPs under the proposed action would generally be implemented, including mitigation measures, as planned; however, this alternative would modify season of use, numbers, and class. For example, a three-pasture rest rotation system would continue to be a three-pasture rest rotation system with all proposed projects, although use levels and seasons might be adjusted. If a proposed AMP became inoperative as a result of adoption of the wildlife effective alternative, a new AMP would be written to allow livestock use while optimizing conditions for wildlife. As vegetative condition improved, an additional 26,265 AUMs would become available for allocation to wildlife.

There are five components consisting of systems based on (1) elk winter range, (2) deer winter range, (3) deer intermediate range, (4) elk or deer summer range, and (5) pronghorn range. Although some of these ranges may overlap, the components would be implemented in the order given above, which is based on degrees of potential competition with livestock and the amount of seasonal range for each species.

The program component for elk winter range would involve the elimination of all late fall and winter grazing. If browse, trend, and utilization studies indicated sufficient remaining forage, some or all of these AUMs could be shifted to spring and summer use. The system is based on a method presented in the Journal of Range Management (Anderson and Scherzinger 1975) and will be discussed more completely in the analysis section.

Other areas not comprising elk winter range but making up deer winter range would have winter livestock use eliminated (see table 8-14). Spring use would be allowed within the confines of range readiness criteria, and summer use would also be allowed. In both cases, condition, trend, and utilization would be closely monitored. When conditions warranted, eliminated winter AUMs could be returned in the form of summer and early fall livestock use.

A number of areas encompass deer intermediate (spring-fall) range. As noted earlier, the spring period is one of intense competition in which all grazing species vie for limited green forage. Livestock use would not be allowed on these areas during the spring or fall period. Any use made of these allotments during the summer would be light enough to allow adequate remaining forage for fall deer use.

Summer is the period of most abundant forage, and competition is at its annual low. Therefore, areas of deer and elk summer range would continue to be grazed by livestock. However, condition, trend, and utilization would be closely monitored. If it were determined that range trend relative to wildlife was down, livestock use would be modified accordingly. Essentially, this program component would involve the smallest deviation from the proposed action.

A fifth component has been devised for areas which are yearlong pronghorn antelope range. Sheep present the most competition to pronghorn as a result of dietary overlap, so no sheep use would be allowed. Due to the present poor condition of most of this range, livestock use would be reduced to levels at which total browse utilization did not exceed 40 percent of current annual growth.

Particular attention would be paid to areas of actual or potential endangered species habitat. Studies would be conducted to determine the effects of grazing versus no grazing on the *Nokomis fritillary*. No actions would be allowed to reduce or eliminate existing prairie dog colonies, potential habitat of the black-footed ferret. Measures would be taken to insure as little disturbance as possible to the two nesting pairs of peregrine falcons. These

TABLE 8-14

DESCRIPTION OF WILDLIFE EFFECTIVE ALTERNATIVE

Allotment Name and Number	Pasture	Wildlife Program component1/	Season of Use Under Proposed Action2/	Changes Due to Wildlife Effective Alternative2/
103 Haystack	All	4	SpSuFa	No change.
105 South of the Road	All	3	SuFa	Shift Fa to Wt.
108 Longshore	McKenzie & Briar	3	SpFa	Shift use to Su.
	South	4	SpFa	No change.
113 Fessler	All	3	SpFa	Shift use to Su.
115 Spring Creek	West Spring Canyon	1	SpSu	Eliminate Su use.
	East Spring Canyon Middle Pasture Buck Pasture	3	SpSu	Eliminate Sp use.
116 Bangs Canyon				
Bangs	Pastures 1,2,3,4,6	2	SpWt	Eliminate Wt use. Shift to SpSu.
Upper Bench	Pasture 5	4	SpWt	Eliminate Sp use.
Files	Pastures 7,8	2	SpWt	Shift to SpSu.
Landini-	Pasture 9	3	SpWt	Shift Sp to Su.
Dead Horse	Pastures 10,11	2	Wt	Shift to Sp and Su.
125 Aubert Brothers				
Skinner & Duval	All	3	Sp	Shift to Su.
Snyder Flats	All	1	SpSu	Follow intensive plan 1. No change in season.
28-Hole	All	2	WtSp	Shift Wt to Su.
Lower Bench	All	2	Wt	Shift to SpSu.
130 Colorado-Black Ridge	All	2	SpWt	Shift to SpSu.
133 Reservation	All	3	SpWt	Shift to WtSu.
135 Knowles-Little Dolores	All	2	SpWt	Shift Wt to Su.
137 Timber Ridge	All	3	SpFa	Shift to Su.
141 Three Canyons	All	2	SpSu	No change - livestock use will

TABLE 8-14 (Continued)

DESCRIPTION OF WILDLIFE EFFECTIVE ALTERNATIVE

Allotment Name and Number	Pasture	Wildlife Program component1/	Season of Use Under Proposed Action2/	Changes Due to Wildlife Effective Alternative2/
				be late enough to insure no damage to browse.
403 Dugway	Palisade Point	4	SpFa	No change.
	Dugway Beaver Mesa Gateway	2	SpFa	No change.
148 Thompson-NE Creek	Pastures A,C	4	SpSu	No change.
	Pasture B	2	SpSu	No change.
150 Meinhart	All	1	Su	Shift to intensive SpSu use of plan 1.
152 Round Knob	All	2	SpFa	No change.
154 Lost Canyon	All	2	WtSp	Eliminate Wt use.
157 Boulder Canyon/ Ladder Canyon	Pasture A	2	SpFa	No change.
	Pastures B,C	3	SpFa	Shift use to Su.
161 Coates Creek	All	3	Sp	Shift use to Su.
163 King				
Fish Canyon/ West Toms	All	3	SpWt	Shift Sp to Su.
Beezer	All	3	SpWt	Shift Sp to Su.
Hill Creek Flats	Hogback Sage Flat	4	SpSuFa	No change.
	South McKenzie	1	SpSuFa	Eliminate Fa use. Change to intensive SpSu use of plan 1.
202 Kannah Creek Common	Pastures 2,3	1	SpFaWt	Eliminate FaWt use. Change to intensive SpSu use of plan 1.
	Pasture 1	5	SpFaWt	No change in season - reduce AUMs.
203 Whitewater Common	All	2	SpFaWt	Eliminate late Fa & Wt use.
304 Woodring	All	1	SpFa	Eliminate Fa use. Change to intensive SpSu use of plan 1.
401 Palisade Flats	All	2	SpWt	Eliminate Wt use.
402 Bull Draw Common	Pasture A	2	SpFa	No change.
	Pasture B	1	SpFa	Eliminate Fa use. Manage spring use intensively as

TABLE 8-14 (Continued)

DESCRIPTION OF WILDLIFE EFFECTIVE ALTERNATIVE

Allotment Name and Number	Pasture	Wildlife Program component[1/]	Season of Use Under Proposed Action[2/]	Changes Due to Wildlife Effective Alternative[2/]
				per plan 1.
405 Wright Draw	All	1	SpFa	Eliminate Fa use. Change to intensive SpSu use of plan 1.
406 Blue Mesa	All	2	WtSp	Eliminate Wt use.
407 Bull Hill Maverick	All	2	SpFaWt	Eliminate late FaWt use.
409 Sinbad Valley	All	2	FaWtSp	Eliminate late FaWt use.
410 Ute Creek	All	2	FaWtSp	Eliminate late FaWt use.
433 Hamilton	All	2	FaWt	Shift use to late spring.
416 North Creek	All	2	SpWt	Eliminate Wt use.
419 Hubbard	All	2	SpSuFaWt	Eliminate late FaWt use.
420 GML	All	2	SpWt	Eliminate Wt use.
424 Bergis North Mesa	All	1	SpSu	Change to intensive SpSu management of plan 1.
429 Dolores Point	All	2	SpFaWt	Eliminate late FaWt use.
411 Dolores River	All	2	Sp	No change.
502 Coal Gulch/ Roan Creek	Pastures 1,2,3,4,5 Pastures 6,7	4 2	SpSuFa SpSuFa	No change. Eliminate late Fa use.
503 Garr Mesa	Pastures 1,2,3,4 Pastures 5,6	2 4	SpSuFaWt SpSuFaWt	Eliminate late FaWt use. No change.
504 Hunter Wash	Pasture 1 Pastures 2,3	2 5	SpFaWt SpFaWt	Eliminate late FaWt use. No change in season. Eliminate sheep AUMs.
505 Buniger	All	2	SpSuFa	No change.
506 Lapham Canyon	All	4	SpSu	No change.
507 Little Salt	All	5	WtSp	No change in season, AUMs reduced to 40% browse utilization.
508 Mogenson	All	5	Fa	No change in season, AUMs reduced to 40% browse utilization.

TABLE 8-14 (Continued)

DESCRIPTION OF WILDLIFE EFFECTIVE ALTERNATIVE

Allotment Name and Number	Pasture	Wildlife Program component1/	Season of Use Under Proposed Action2/	Changes Due to Wildlife Effective Alternative2/
601 Badger Wash	All	5	Wt	No change in season. Change class of livestock from sheep to cattle. AUMs reduced to 40% browse utilization.
603 West Salt	Canal, 7 mile	5	SpSuFaWt	No change in season - Aums reduced to 40% browse utilization.
	Desert Rims, South Canyon	4	SpSuFaWt	No change.
	East Salt, Evacuation Creek	2	SpSuFaWt	Eliminate FaWt use.
604 Crow Bottom	All	2	Wt	Shift use to Fa.
610 Maluy	All	5	SpFa	No change.
612 Baker	Pasture 1	5	WtSp	Eliminate sheep use.
	Pasture 2	2	WtSp	Eliminate Wt. use.
613 Rabbit Valley	Pasture A	2	WtSp	Eliminate Wt. use.
616 Prairie Canyon	Pasture A	2	SpSuFa	No change.
	Pastures B,C	4	SpSuFa	No change.
702 Berry Homestead	All	2	SpWt	Eliminate Wt. use.
703 Spears	Pastures 1,2	2	SpSuFa	Eliminate late Fa use.
	Pastures 3,4,5	4	SpSuFa	No change.
705 Brush Mtn. Common	All	4	Su	No change.
706 Burdick	All	2	SpFa	No change.
710 Rodeo Grounds	All	2	SpFa	Eliminate late Fa use.
712 Coon Hollow	All	2	SpFa	No change.
714 Doughtery Gulch	All	4	SpSu	No change.
715 Dry Fork	All	2	SpSuFaWt	Eliminate late FaWt use.
716 Head of Carr Creek	All	4	SpSu	No change.
723 Henderson 4/A Ridge	All	4	Su	No change.
724 Kimball	All	4	SpSuFa	No change.

TABLE 8-14 (Continued)

DESCRIPTION OF WILDLIFE EFFECTIVE ALTERNATIVE

Allotment Name and Number	Pasture	Wildlife Program component1/	Season of Use Under Proposed Action2/	Changes Due to Wildlife Effective Alternative2/
732 Logan End Common	All	4	Su	No change.
733 Logan Gulch	All	2	WtSp	Eliminate Wt use.
737 Lower Roan Creek	Eby Pasture	2	SpFa	No change.
	Cedar Bench Gasaway Bench	4	SpFa	No change.
742 Paddock	All	4	SpSuFa	No change.
744 Roan Creek	All	1	SpSu	No change in season. Change to intensive SpSu use of plan 1.
745 Round Mountain	All	2	SpFa	No change.
748 Upper Brush Mtn.	All	4	Su	No change.
754 Whittaker Flats	All	2	Wt	Shift use to SuFa.
755 4-A Individual	All	4	SpSu	No change.
807 Spring Creek to Coon Creek	All	1	SpFa	Eliminate Fa use. Change Sp use to intensive management of plan 1.
808 White Mountain	All	2	Sp	No change.
809 Wild Country	All	2	Sp	No change.
811 Lyons/Anderson	Lyons Anderson	2 1	Wt Wt	Shift use to Su. Change class to cattle. Change use to intensive management of plan 1.
843 Big Park	All	2	Wt	Shift use to Fa.
835 Lower Rapid/ Cottonwood	All	2	SpSuFa	No change.
847 Jerry Gulch	All	2	Sp	No change.

1/ For additional information on wildlife program components, see the description of Alternative D on the preceding pages.

2/ Sp = spring, Su = summer, Fa = fall, and Wt = winter.

measures are similar to those that would be carried out under the proposed action (see chapter 1, BLM Standard Operating Procedures, and chapter 3, Wildlife, Threatened and Endangered Species).

The 88 less intensively managed allotments would all fall into one of the categories listed above. They would therefore be subject to the same livestock management.

It is felt that proper management of all allotments for the major big game species would provide habitat suitable for other wildlife. Studies would be conducted annually in close cooperation with DOW to insure that sufficient food, space, cover, and water were available for the entire complex of wildlife species present. If it were determined that a shortage existed for a particular wildlife species or area, adjustments in livestock numbers, class, season of use, or distribution would be made in accordance with the realized needs.

Table 8-14 details, both on an allotment and individual pasture basis, the changes in season of use under this alternative. For information on reductions in livestock grazing, see table 8-1.

To improve and enhance aquatic and riparian habitat within the ES area, this alternative proposes specific management objectives. These objectives would be incorporated into all grazing systems, including less intensive management systems, on public land where livestock currently graze or have access to critical riparian habitat. The objectives are as follows:

1. A minimum of 70 percent riparian plant cover would be maintained (natural conditions permitting).
2. A minimum of 40 percent canopy shade cover would be maintained over streams supporting fish (natural conditions permitting).
3. Visible evidence of livestock trampling would be reduced to a maximum of 10 percent of the total linear distance along banks.
4. Grasses, sedges, and forbs would be maintained at an average height of 4 to 6 inches in riparian areas.
5. Current annual growth utilization of woody riparian vegetation by livestock would not exceed 30 percent per year, cycle, or pasture, depending on the grazing system and the area.
6. Maximum woody vegetation heights would be attained in all riparian zones capable of supporting such vegetation.
7. Areas capable of supporting riparian vegetation but listed as poor (see appendix 11) would be planted with appropriate riparian plant species and protected from livestock until the above objectives were reached.

The above objectives would not be feasible in certain areas where natural conditions are not suitable. However, in any area which has the potential to meet the objectives, the following measures would be taken, if necessary:

1. The number of livestock would be reduced or eliminated on allotments or in pastures containing riparian habitat.
2. Livestock use would be reduced or eliminated by fencing riparian and aquatic habitats. Water gaps for deer, elk, and livestock would be provided at approximately half-mile intervals.

In actual practice, the above measures would result in the elimination of grazing on riparian areas in fair to poor range condition until the condition became good. If it were necessary to fence all fair to good riparian areas, it would require 1,417 miles of fencing. Table 8-15 shows allotments having poor or fair riparian areas and the number of acres involved.

The overall effect of this alternative would be a reduction of approximately 27,244 AUMs in active qualifications. This would represent a 28.7 percent reduction over the current level of qualifications.

Impact Analysis

Vegetation

Wildlife program component 1 would allow limited spring livestock grazing on portions of twelve allotments to delay the phenological sequence (flowering and seed development) of the preferred forage plants. Livestock would be removed from these areas soon enough to allow regrowth to occur prior to onset of high summer temperatures. The high temperatures would cause cessation of growth in cool season plants and prevent reproduction and seed development. The continuation of this practice would eventually eliminate preferred forage plants, increase unpalatable and woody plants, and result in a deteriorated range condition. However, proposed AMP grazing systems would be modified to accommodate use during this period, thus permitting plants to attain maturity oftern enough to allow for sexual reproduction. Provisions would be made for periods of rest to provide opportunity for preferred forage plants to complete growth and reproduction and provide for renewed storage of energy.

Summer grazing would be allowed on all remaining portions of the twelve allotments covered by component 1. Grazing at this time would provide seed trampling of early maturing, cool season plants, while warm season plants may be adversely affected due to defoliation. Range conditon would be expected to remain static on these areas, with cool season grasses tending to replace warm season grasses. Impacts on vegetation due to the develop-

TABLE 8-15

PRESENT RIPARIAN HABITAT RANGE CONDITION

Allotment Number and Name1/	Public Land Acres	Range Condition2/	Grazeable3/ Acres
105 South of the Road	20	Poor	8
108 Longshore	74	Fair	38
116 Bangs Canyon	36	Poor	36
125 Aubert Brothers	16	Fair	16
130 Colorado Black Ridge	83	Fair	83
141 Three Canyons	40	Fair	40
145* Dugway	140 30	Fair Poor	140 30
150 Meinhart	12	Fair	12
154* Lost Canyon/Sugar Bench	75	Poor	75
203 Whitewater Common	10	Fair	10
301E Gibbler Common	293 231	Fair Poor	293 231
302E Wagon Park Common	90 371	Fair Poor	90 371
405 Wright Draw	5 3	Fair Poor	0 1
419 Hubbard	20	Poor	20
420 GML	18	Poor	18
433 Hamilton	10	Fair	10
501E Big Salt	60	Poor	0
503E Garr Mesa	128	Poor	128
602E East Salt	439	Poor	439

TABLE 8-15 (Continued)

PRESENT RIPARIAN HABITAT RANGE CONDITION

Allotment Number and Name1/		Public Land Acres	Range Condition2/	Grazeable3/ Acres
603	West Salt Common	283	Poor	283
604	Crow Bottom	175	Poor	175
703	Spears	158 13	Fair Poor	158 13
713	Winter Flats/Deer Park	34	Fair	0
721	Head of Carr Creek	294	Poor	294
737	Lower Roan Creek Common	16	Poor	16
742	Paddock	19	Poor	15
745	Round Mountain	26	Fair	26
754	Whittaker Flats	107	Fair	107
807	Spring Creek	26 19	Poor Fair	26 19
		2257 ac. 1177 ac.	Poor Fair	2179 Poor 1042 Fair
Total		3,374		3,221

1/ E indicates existing AMP; * indicates allotment is partially located in Utah.

2/ See appendix 3 for methodology used for determining present range condition.

3/ See glossary; these acres would be closed to grazing by fencing.

ment of range facilities would be the same as those described in the proposed action.

Wildlife program component 2 would eliminate fall and winter livestock grazing on 35 areas of 32 allotments. Shrub production would be favored on these areas. Spring and summer use on the remaining areas of the allotments could reduce grass growth and reproduction due to increased competition from woody plant species.

Elimination of fall and winter livestock grazing would increase litter and range condition would be expected to improve slightly or remain static.

Wildlife program component 3 would shift livestock use from spring to summer on twelve areas in eleven allotments. This would allow an opportunity for growth and development of preferred forage plants, although seed development may not be attained on those plants grazed prior to maturation. Plant vigor would increase, resulting in approximately 6,563 additional acres going from poor to fair range condition and 3,414 additional acres going from fair to good condition by the year 2000.

The elimination of fall livestock use would increase seed production of shrubs but decrease the germination rate of seed from virtually all species. Four of the eleven allotments affected by component 3 would receive these impacts.

Wildlife program component 4 proposes the same use levels as the proposed action and involves 22 areas on 22 allotments. This would be expected to have the same impacts on vegetation and range as those described for the proposed action.

The component for pronghorn range proposes some changes in class of livestock and possible reductions in AUMs. This involves eight areas on eight allotments and would have impacts similar to those described in the proposed action except where the kind of livestock was changed from sheep to cattle. These areas would show a decrease in grass production and an increase in forb and shrub cover and vigor.

Protection of riparian areas would improve vegetation quality and quantity and range condition on some localized areas.

Range condition is expected to improve as reductions in livestock levels are imposed and as the grazing plans prove effective. The overall increase in livestock forage production is expected to amount to 26,265 AUMs. Table 8-16 portrays the anticipated overall impacts to vegetation.

Threatened and Endangered Plants (Proposed)

The impacts to proposed threatened and endangered plants under the wildlife effective alternative would be the same as with the proposed action.

Soils

Impacts with the wildlife effective alternative would be essentially the same as with the proposed action.

Portions of four of the allotments proposed for the enhancement of elk and deer winter ranges -- Bangs Canyon (116), Hamilton (433), Whittaker Flats (754), and Lyons/Anderson (811) -- could show an increase in erosion, since livestock use would be changed from strictly fall or winter to include spring and summer use. Increased surface soil compaction could develop.

Since livestock use reductions were planned where wildlife use could replace them, the remaining impacts to soils would be similar to those discussed in chapter 3.

Water Resources

Since reductions in livestock use are designed to allow wildlife to increase their use of forage, most of the water resources impacts would be similar to those outlined in chapter 3. However, the following allotments would have a change in season of use from strictly fall or winter to spring or summer: Bangs Canyon (116), Hamilton (433), Whittaker Flats (754), and Lyons/Anderson (811). This change to spring or summer use would result in 10 to 30 percent increases in runoff and sediment yield on these allotments.

Overall, spring use would be only slightly diminished, summer use nearly doubled, fall use moderately decreased, and winter use reduced by approximately two-thirds (see table 8-14). The net result is that runoff would increase by more than 15 acre-feet, while sediment yield would increase by more than 100 tons over the ES area; neither of these impacts is significant. Salinity would decrease by slightly less than .005 milligrams per liter TDS at Imperial Dam. Channel erosion would decrease as a result of stream channel fencing.

Wildlife

TERRESTRIAL WILDLIFE

Allotments which would follow program component 1 are shown in table 8-14. The plan relies on the manipulation of the physiology of preferred forage plants through grazing to improve nutritive value at maturity. Rest rotation would continue to be used whenever possible and turn on dates would be based on range readiness. Cattle would be removed from the early use pasture soon enough to allow regrowth to occur.

This regrowth would, however, be phenologically later than the growth of ungrazed plants. When properly planned, the heat and drought of summer would cause a cessation of plant growth when these regrowth plants are still at an immature stage.

TABLE 8-16

IMPACTS ON VEGETATION
WILDLIFE EFFECTIVE

	Present[1]	Predicted[1]
Range Condition[2] (ac.)		
Good	216,885	581,958
Fair	566,403	455,806
Poor	417,569	163,093
Production (AUMs)	109,705	135,970

NOTE: Data encompasses all public land acreage. Note that while production would increase dramatically under this alternative, range condition improvement would be partially offset by increased wildlife usage.

1/ Methodologies used to determine present and predicted range condition and production are located in appendix 3.

2/ Range condition refers to forage, not ecological, condition.

Termination of growth due to heat and drought would "fix" nutrients in plant tissues, creating more nutritous forage for winter elk use. When possible, cattle would use as many early pastures as possible in such a way as to provide regrowth in more than one pasture. Provision would be made to permit plants to attain maturity often enough to allow for sexual reproduction.

Summer use would be allowed in remaining pastures to provide seed trampling as long as it does not deplete elk winter forage. Fall and winter use by livestock would be eliminated in order to better reduce competition. These AUMs could be shifted to spring use as range conditions improved. A more complete discussion of this system is available upon request from the Grand Junction District Office.

Success of this system would require the same fencing and water developments as proposed in the AMPs. Salting would be required to improve livestock distribution. In addition, wildlife sanctuary settings would have to be created by reserving some important canyons for wildlife only. It would also be necessary to close roads and trails seasonally to prevent harrassment.

Expected benefits under this component are:

1. Improved forage quality and quantity for both elk and cattle.
2. Increased use of these areas by elk.
3. Improved ecological condition of area.
4. Improved habitat for nongame wildlife.
5. Improved health and vigor of big game populations due to more nutritious forage availability.

Mule deer would also be benefited by this plan, although to a lesser degree, because they are less dependent on grass as winter forage and commonly use areas less accessible to livestock.

Program component 2 covers those areas on which mule deer winter. In order to reduce forage and space competition, late fall and winter livestock use would be eliminated. Spring livestock use would not be allowed prior to range readiness to insure the least damage to the browse community. It is expected that mule deer populations would improve in both health and numbers as browse condition improved with this system. Nongame wildlife species, especially those associated with the shrub complex, are also expected to increase.

Program component 3, to be implemented on areas of deer spring and fall use, is expected to reduce livestock/wildlife competition. Shifting of livestock use from spring to summer would aid in seed trampling as well as improving the vigor and cover of forage species.

Program component 4 covers areas of deer and elk summer use, which are generally the areas of least competition. Conditions, trend, and utilization would be closely monitored under this plan, as well as others, and stocking reductions would be carried out if it was determined that range trend was down. Basically, there would be no additional impacts on these areas than were stated for the proposed action.

Program component 5, management for pronghorn antelope, would result in livestock reductions after proper stocking rates have been determined through range surveys. A number of changes in kind from sheep to cattle would also occur. Reductions in use would result in improved browse cover and vigor. The elimination of sheep use would result in decreased grazing of forbs and, therefore, less competition with pronghorns. Pronghorn numbers are not expected to increase significantly; however, vigor and condition of these animals should improve.

No one program component or system can be responsible for changes in wildlife populations. However, all five systems, considered areawide, would result in an increase of 16 to 17 elk and 1,748 to 1,821 deer over the present situation.

AQUATIC AND RIPARIAN WILDLIFE HABITAT

The terrestrial wildlife programs would not have impacts significantly different from the proposed action as far as aquatic and riparian wildlife habitat are concerned. The aquatic and riparian program component, though, would result in highly beneficial impacts.

The riparian and aquatic habitat on public land should return to pregrazing conditions by 2000. Riparian species would increase and become reestablished in most areas. Livestock exclusion would result in decreased streambank erosion and provide channel morphologies more suitable for fish (Gunderson 1968). As stream morphology and riparian habitat improved, turbidity and sedimentation would decrease, resulting in significant increases in the range, abundance, and diversity of both terrestrial and aquatic species associated with terrestrial and aquatic habitat.

Threatened and Endangered Species

Protective fencing of riparian areas would enhance cottonwood reproduction and assure the continued presence of eagle perches along the major streams.

Fencing would also allow the various vegetation layers (grass and forb, shrub and tree) to completely develop, which would provide for the maximum abundance and diversity of songbirds. Riparian zones are often a favored hunting area for peregrine falcons, so increasing bird populations would enhance areas thought to be historic or potential peregrine habitat.

Protective fencing of the spring area occupied by the Great Basin Silver Spot Butterfly would eliminate the present damage occurring to vegetation and litter as a result of livestock grazing. On this same area, the relationship between livestock grazing and habitat requirements of the butterfly are poorly understood when considering suppression of woody vegetation, hummock development, plant pedestaling, and soil disturbance for establishment of new violet plants. The protective fence would allow the study of these relationships which will guide future management of the butterfly habitat.

Livestock Grazing

This alternative would eliminate approximately 14,561 AUMs. As table 8-1 indicates, these reductions are in addition to those already proposed in chapter 1. This would result in a total loss of 27,244 AUMs over the present 94,822 AUMs of active qualifications from public lands. This loss represents about 28.7 percent of the total AUMs derived from public lands in the ES area. In addition, further reductions in use could be administered on these and other allotments if wildlife objectives were not being met within the desired time period.

In general, livestock operators with inadequate resources to make the transition to reduced livestock numbers, class of livestock, or season of use would soon be forced out of the livestock business. This would create an areawide, long-term, major impact on livestock grazing.

Socioeconomic Conditions

INCOME

This alternative would involve implementing the projects identified in the proposed action, chapter 3, but the implementation phase would be extended a few years. The income impacts would be basically the same as those discussed in chapter 3 for the proposed action for three sectors of the ES area economy. These sectors are contract construction, government, and recreation. The only alteration in the described impacts would be that they would be extended over a slightly longer period of time during implementation. However, the total magnitude of these impacts for these three sectors is not expected to change.

The income impact on range livestock related income would be different than that discussed in chapter 3. There would be 62 ranches (size and types indicated in table 8-17) impacted with income losses resulting from forage reductions. Six of these ranches would also be affected by elimination of grazing on six allotments every third year. Two operators not involved with forage reductions would also be affected by the elimination every third year for a total of eight ranches. There would be an elimination of 445 AUMs besides the forage reductions impacting operators on these six allotments. If alternative forage were not available and feeding of hay were necessary to maintain livestock herds through the periodic eliminations, it would cost an estimated $7,743 for hay. This would result in a reduction in net revenues for the eight ranches involved if the cost did occur.

A total of 64 ranches in all would be impacted by forage use reduction, elimination, or both. Tables 8-18 and 8-19 indicate their dependency on BLM forage and the criticality of that dependency. It is estimated that ranching is the primary source of income for 39 of the 66 ranch families (some ranches support more than one family). The estimated gross and net revenue changes for ranches by size and type are indicated in table 8-17.

Gross revenue is expected to decrease by an estimated $1,562,156 which means a corresponding reduction of $1,249,724 in sales in other sectors of the ES economy. This change in business activity (sales) is estimated by using the business activity multiplier of 1.8.

Net revenue is expected to be reduced by $694,601. This change in direct ranch livestock related income would result in an additional reduction of $416,761 in indirect income when the income multiplier of 1.6 is applied to the change in direct income. Thus the total direct plus indirect income reduction in the ES area would be $111,362 or 0.306 percent of 1976 Mesa County personal income.

These income reductions on a ranch basis would mean that an estimated 50 of the 62 ranches afected by these forage use reductions would be experiencing negative net income. The capability of these ranching operations to survive income reductions of the magnitude indicated is not known. It is possible that many of the operations would cease, with some recombining of properties occurring.

EMPLOYMENT

The same impacts discussed for the proposed action in chapter 3 would apply for contract construction, government, and recreation. The only alteration in the described impacts is that the extension of the implementation phase by a few years would spread the absolute magnitude of this phase on employment over a little longer period of time.

Employment in the livestock sector could be decreased by an estimated 24.55 man years of hired ranch employment. This would be relatively small when compared to ES area employment as a whole.

TABLE 8-17

RANCH SIZE AND INCOME EFFECTS

WILDLIFE EFFECTIVE

Model	Cattle	Sheep	Number of Ranches	Total BLM AUM Reduction	Total Corresponding Private Land AUM Reduction	Total BLM plus Private AUM Reduction	Average AUM Reduction per Ranch	Gross Revenue Changes per Ranch	Gross Revenue Changes/All Ranches	Net Revenue Changes per Ranch	Net Revenue Changes/All Ranches
I	0 to 249		17	4,028	220	4,248	250	$-14,698	$- 249,866	$- 3,855	$- 65,535
II	250 to 549		15	3,323	2,390	5,713	381	-16,722	- 250,830	- 6,553	- 98,295
III	550 to 749		6	7,748	957	8,705	1,451	-87,647	- 525,882	-34,555	-207,330
IV	750 or greater		11	5,971	441	6,412	583	-36,908	- 405,988	-13,845	-152,295
V	0 to 220	0 to 1000	4	2,131	1,341	3,472	868	-23,564	- 94,256	-37,148	-148,592
VI	221 to 1300	650 to 5400	5	1,367	222	1,589	318	+ 66	+ 330	+ 413	_ 2,065
VII		500 to 1249	1	508	0	508	508	-36,038	- 36,038	-21,427	- 21,427
VIII		1250 or greater	3	2,168	196	2,364	788	+ 98	+ 294	- 1,064	- 3,192
Total			62	27,244	5,767	33,011			$-1,562,176		-694,601

SOURCE: BLM Range Automated Data System, 1978, for ranch sizing.

NOTE: Income effects derived from analysis in appendix 12. Gross and Net revenue effects have been adjusted to compensate for the non fee payment on private AUMs. Private AUMs within allotments have been included in the ranch income analysis since their level of use changes proportionally with BLM AUMs.

TABLE 8-18

OPERATOR/RANCH DEPENDENCY ON BLM GRAZING WILDLIFE EFFECTIVE

% Dependency	Number of Ranches
0 to 10	19
11 to 20	13
21 to 30	15
31 to 40	8
41 to 50	5
51 to 60	1
61 to 70	0
71 to 80	0
81 to 90	3
91 to 100	0
	64

TABLE 8-19

CRITICALITY OF OPERATOR/RANCH DEPENDENCY ON BLM GRAZING WILDLIFE EFFECTIVE

Criticality	Number of Ranches	% of Total
High	33	51.6
Medium	21	32.8
Low	10	15.6
Total	64	100

NOTE: High means that BLM forage use is judged to be an essential element for the survival of the ranching operation. Medium means that BLM forage use may or may not be an essential survival element. Low means that BLM forage use is judged to not be essential to the ranching operation survival.

A judgmental estimate of the criticality of rancher dependency on public land grazing was made by BLM personnel by applying the following three criteria to each ranching operation:

1. Proportion of forage acquired on public land.
2. Season that forage is acquired.
3. Ease in acquiring alternate sources of forage.

PUBLIC FINANCE AND TAX BASE

The ES area tax base would be decreased since active use qualifications would be reduced from the present level of 94,822 to 67,578 AUMs.

This 27,244 AUM reduction in allowable use (active use qualifications) would result in an estimated loss of about 2,270 animal units of carrying capacity for those base property ranches affected. This would result in a reduction of about $2,270,000 in the market value of those ranches. This decrease would be translated in a reduction of about $113,500 (at 5 percent of market value) in assessed valuation, or about 0.055 percent of 1977 Mesa County assessed valuation (Colorado Dept. of Local Affairs 1977).

It should be noted that Colorado agricultural land prices reflect demand influences for land which involve considerations other than future ranch income. Therefore, the likelihood that ES area ranch property would appreciate is acknowledged. However, values of ranch property with decreased present value as a result of grazing qualification losses might be expected to increase at a slower rate than those similar properties experiencing no decrease.

Livestock herd reductions would result in an estimated decrease of $10,192 local property taxes paid by the affected ranches (appendix 12).

SOCIAL WELL-BEING

The social well-being of the 240 people associated with the livestock use reductions would be adversely impacted due to income losses and possible changes in their lifestyle and relative community standing. In addition, some paper losses in the value of ranches impacted by the reductions could occur. The impact on the overall social structure of the ES area would not be significant.

SOCIAL AND CULTURAL ATTITUDES

There could be some conflict with the ranching community since a traditional ES area land use would be curtailed. Those directly impacted by reductions could feel themselves deprived of opportunities to pursue what they consider to be hard-working, independent existence.

Visual Resources

The impacts resulting from this alternative would be the same as stated for the proposed action.

Recreation

Impacts of this alternative on recreation resources would be the same as with the proposed action, with one important exception. Because of the increases in deer and elk numbers, hunting and sightseeing opportunities would increase. Increases in deer would be especially important; a population gain of 1,821 animals is anticipated by the year 2000 under this alternative.

Wildland Areas

Impacts to wildland areas would be identical to those described for the proposal.

Air Quality

Air quality impacts with this alternative would be similar to those arising from the proposed action.

Cultural Resources

This alternative would reduce grazing at certain times of the year, which would reduce possible livestock rubbing or trampling of historic sites proportional to the number of days that livestock did not use rangelands. Decreased erosion resulting from the overall favorable vegetation response would constitute a beneficial impact. Vandalism and inadvertent damage impacts would be identical to those described for the proposed action.

ALTERNATIVE E: WATERSHED EFFECTIVE

The purpose of this alternative is to protect watershed properties by improving total ground cover and eliminating soil compaction during critical wet periods in certain allotments. The allotments that fall within the area represented by watershed 6 through 10 on map 2-7 would have spring-summer grazing (March 15 to September 15) either eliminated or changed to fall-winter grazing. All other portions of the proposed action with their mitigating measures would remain unchanged.

Complete removal of grazing from Mancos Shale soils was initially considered. However, it was found that complete removal did not lead to significantly different impacts than removal of spring-summer grazing only on these soils.

Spring grazing would be eliminated on three existing AMPs, fourteen proposed intensive management AMPs, and thirteen less intensive management allotments. Both spring and summer grazing would be eliminated on three proposed AMPs (intensive) and six less intensively managed allotments. Grazing would be shifted from spring and summer on four proposed AMPs (intensive) and two less intensive management allotments.

Overall, a reduction of 7,632 AUMs would occur on these allotments in addition to the reductions proposed in chapter 1. The net result with this alternative would be a loss of 20,315 AUMs of active qualifications, from 94,822 to 74,507. This would amount to a reduction of 21.4 percent over the current level of qualifications. See table 8-20

TABLE 8-20

ALLOTMENTS REVISED TO PROTECT WATERSHED QUALITY

Spring Grazing Eliminated		Present Use (AUMs)	Proposed Use (AUMs) Proposed Action	Proposed Use (AUMs) Alternative E
146	North Fork[1/]	60	60	0
201	Davis AMP[2/]	427	427	227
202	Kannah Creek Common	3,698	2,741	1,902
203	Whitewater Common	2,422	2,422	1,269
204	Highway Individual[1/]	77	77	66
205	Whitewater Hill[1/]	118	118	91
207	Kannah Creek Individual[1/]	105	105	57
301	Gibbler[2/]	3,315	3,315	2,635
302	Wagon Park[2/]	1,164	1,164	724
401	Palisade Flats	400	400	165
402	Bull Draw	182	182	137
403	Dugway	554	331	217
405	Wright Draw	138	138	119
406	Blue Mesa	2,408	1,099	580
407	Bull Hill-Maverick	564	553	288
409	Sinbad Valley	766	641	365
410	Ute Creek	260	260	130
411	Dolores River	366	103	80
415	Tom Casto[1/]	6	6	0

TABLE 8-20 (Continued)

ALLOTMENTS REVISED TO PROTECT WATERSHED QUALITY

Spring Grazing Eliminated		Present Use (AUMs)	Proposed Use (AUMs) Proposed Action	Proposed Use (AUMs) Alternative E
416	North Creek	55	55	26
417	Unaweep[1/] North & South	310	310	167
420	GML	350	36	65
422	J.L. Individual[1/]	37	37	28
423	EHL - W. Creek Individual[1/]	2	2	1
425	North & South[1/] Unaweep	21	21	14
428	Nelson Individual[1/]	175	175	0
429	Dolores Point	1,001	910	379
430	Salt Wash[1/]	55	55	20
431	Cottonwood[1/]	222	222	80
818	Davis Individual[1/]	34	34	26
	Subtotals	19,282	16,049	9,858
Spring-Summer Grazing Eliminated				
151	Pine Ridge[1/]	120	120	27
419	Hubbard	831	831	75
424	Bergis North Mesa	223	143	0
427	Turner Gulch[1/]	60	60	0
432	Beeman[1/]	33	33	10
821	Fetters[1/]	12	12	2
835	Lloyd Individual[1/]	111	111	20
844	Lower Rapid/Cottonwood	279	278	70
845	Chalk Mountain[1/]	70	70	13

TABLE 8-20 (Continued)

ALLOTMENTS REVISED TO PROTECT WATERSHED QUALITY

Spring Grazing Eliminated	Present Use (AUMs)	Proposed Use (AUMs) Proposed Action	Proposed Use (AUMs) Alternative E
Subtotals	1,738	1,658	217
Grazing Shifted to Fall			
304 Woodring	75	75	75
807 Spring Creek to Coon Creek	513	513	513
808 White Mountain Common	401	401	401
809 Wild Country	746	746	746
816 Bevan[1/]	18	18	18
842 Nichols[1/]	11	11	11
Subtotals	1,764	1,764	1,764
Grand Total	22,785	19,471	11,839
AUMs Lost			7,632

NOTE: The decrease among the 45 allotments receiving reductions amounts to 39.3%. The overall decrease is 21.4%.

[1/] Allotment under a less intensive AMP.

[2/] Allotment under an existing intensive AMP.

for a portrayal of the alternative on an allotment-specific basis.

Impact Analysis

Vegetation

The general vegetation and range response of this alternative would be highly beneficial. The major difference would be in the amount of acreage in the range condition classes. This response would occur on the 24 intensive AMPs with elimination of spring grazing.

In addition, 21 less intensive AMPs would be affected by this alternative. The elimination of spring grazing on these areas would result in 1,631 acres of fair condition range going to good condition by the year 2000.

Key forage plants on these allotments would benefit from complete rest from livestock grazing during their critical growth periods in the spring and summer; this would be particularly true on the 21 less intensive AMP allotments which are presently receiving yearly spring use. These benefits could be offset on the six allotments where fall and winter use would be increased if grazing utilization during this period exceeded 65 percent.

In general, elimination of spring and summer grazing would favor grasses and forbs at the expense of woody plants. Fall use would involve heavier utilization of woody plants, which have a higher protein content than grasses and forbs in autumn and would be less likely to be covered with snow. Thus, all allotments (except the five where livestock grazing would be eliminated) modified by this alternative would show an increase in grasses and forbs and a decrease in woody plants, or browse. Table 8-21 shows the anticipated overall impacts to vegetation.

Threatened and Endangered Plants (Proposed)

The possibility of proposed threatened and endangered plants being trampled and possibly eaten by grazing animals would be reduced if livestock were removed from the range during the spring and summer grazing seasons, therefore the plants should flourish. Other impacts would remain the same as they would with the proposed action.

Soils

Eliminating spring-summer grazing (March 15 to September 15) for 9 allotments in the critical watersheds (see map 2-7) would have beneficial impacts: ground cover would increase and soil compaction from livestock would lessen. Similar improvements in ground cover and compaction would occur with the elimination of spring grazing on 30 other allotments and the shifting of grazing to fall on allotments. Compaction would decrease because trampling would not occur during spring months when the ground is wet and more vulnerable to compaction.

With improved ground cover, organic matter content would increase in surface soils, improving soil structure, infiltration, permeability, porosity, and productivity. Plant vigor would improve, plant production would increase, and the net result would be reflected in the erosion condition classes.

Table 8-22 displays the expected changes in future erosion condition classes for allotments modified by this alternative, while table 8-23 summarizes the anticipated overall impacts of this alternative on soils. Quantification of erosion condition to determine the future erosion condition classes considered transect data, location, and vegetation type. (See appendix 3 for a more detailed discussion of methodology.)

Water Resources

Elimination of spring-summer grazing on the allotments listed would result in decreased soil compaction. Consequently, runoff and sediment yield would decrease in amounts similar to the five areas -- Lipan Wash, E. Salt Creek, Cone Mountain, Little Horsethief, and Pollock Canyon -- which showed decreases in chapter 3 (refer to table 3-10). The result would be a net decrease in runoff and sediment yield for the entire ES area and an overall improvement in water quality and watershed conditions. Salinity at Imperial Dam would be reduced by 0.043 milligrams per liter TDS.

Ground water and ground water quality is not expected to change because increased vegetation would use any additional soil moisture before recharge occurred. The proposed range facilities would have impacts similar to those outlined in chapter 3.

Wildlife

TERRESTRIAL WILDLIFE

Elimination of spring livestock grazing on the allotments listed in table 8-20 would reserve forage for wildlife during the critical spring green-up. This would include several areas of concentrated deer and elk winter use. This would likely result in improved forage vigor and cover and a probable shift in species composition to more grass at the expense of browse. Livestock use would be exclusively fall/winter in the affected allotments, resulting in increased use of browse and decreased grass use.

The reduction in AUMs and improved overall vegetation would be beneficial to wildlife. The expected decrease in browse would reduce the quality of deer winter ranges. On the other hand, increases in grass would increase the quality of elk

TABLE 8-21

IMPACTS ON VEGETATION
WATERSHED EFFECTIVE

	Present[1]	Predicted[1]
Range Conditions[2] (ac.)		
Good	216,885	621,244
Fair	566,403	473,806
Poor	417,569	105,807
Production (AUMs)	109,705	129,041

NOTE: Data encompasses all public land acreage.

[1] Methodologies used to determine present and predicted range condition and production are located in appendix 3.

[2] Range condition refers to forage, not ecological, condition.

TABLE 8-22

EROSION CONDITION CLASSES FOR EACH ALLOTMENT WITH AMPS MODIFIED BY WATERSHED EFFECTIVE

		Present Condition (Acres)					Predicted Condition (Acres)[1/]				
Allotment	Total Acres	Stable	Slight	Moderate	Critical	Severe	Stable	Slight	Moderate	Critical	Severe
Spring Grazing Eliminated											
201 Davis	6,150		4,121	2,029				4,121	2,029		
202 Kannah Creek Common	29,710		18,717	7,130	3,863			27,333	2,377		
203 Whitewater	22,300		18,955	2,676		669		20,293	1,338	669	
301 Gibbler	45,012		3,601	22,506	18,905			14,854	22,506	7,652	
302 Wagon Park	31,385			17,890	13,495			10,462	20,923		
401 Palisade Flats	8,780		351	2,546	5,883			351	2,546	5,883	
402 Bull Draw	5,084		51	102	4,931			51	2,568	2,465	
403 Dugway	9,800		3,038	4,214	2,548		1,519	3,600	4,681		
405 Wright Draw	3,525			3,172	353			705	2,467	353	
406 Blue Mesa	41,943		10,486	16,777	14,680		4,194	12,583	17,616	7,550	
407 Bull Hill-Maverick	14,600		1,460	4,818	8,322			3,580	9,050	2,000	
409 Sinbad Valley	10,298			2,266	8,032			1,133	9,165		
410 Ute Creek	6,908				6,908				6,908		
411 Dolores River	3,359				1,377	1,982				3,359	
416 North Creek	1,174		59	284	831			59	715	400	
420 GML	3,251			3,251				1,073	2,178		

TABLE 8-22 (Continued)

EROSION CONDITION CLASSES FOR EACH ALLOTMENT WITH AMPS MODIFIED BY WATERSHED EFFECTIVE

		Present Condition (Acres)					Predicted Condition (Acres)[1]				
429 Dolores Point	7,510			4,806	2,704			2,403	5,107		
TOTALS	250,789	0	60,839	94,467	92,832	2,651	5,713	102,571	112,174	30,331	0
Spring - Summer Grazing Eliminated											
419 Hubbard	4,155			748	3,407			1,385	2,770		
424 Bergis North Mesa	1,783		1,783				1,783				
844 Lower Rapid/Cottonwood	5,785	1,041	521	3,182	1,041		1,562	1,041	2,141	1,041	
TOTALS	11,723	1,041	2,304	3,930	4,448	0	3,345	2,426	4,911	1,041	0
Grazing Shifted to Fall											
304 Woodring	1,167			1,167				525	642		
807 Spring Crk. to Coon Crk.	4,730		3,027	1,703				3,596	1,134		
808 White Mtn. Common	2,932			2,932				2,932			
809 Wild Country	7,974			7,974				2,791	5,183		
TOTALS	16,803	0	3,027	13,776	0	0	0	9,844	6,959	0	0

NOTE: Excludes the 21 less intensively managed allotments modified by alternative E.

[1] See Appendix 3 for methodology used in predicting impacts.

TABLE 8-23

IMPACTS ON SOILS

WATERSHED EFFECTIVE

	Stable (Acres)	Slight (Acres)	Moderate (Acres)	Critical (Acres)	Severe (Acres)	Total (Acres)
Allotment not changed	45,603	344,084	346,049	74,750	15,959	826,445
Allotment w/spring elim.	5,713	102,571	112,174	30,331	0	250,789
Allotments w/spring and summer elim.	3,345	2,426	4,911	1,041	0	11,723
Allotments w/grazing shifted to fall	0	9,844	6,959	0	0	16,803
Subtotal	54,661	458,925	470,093	106,122	15,959	1,105,760
Elimination of Grazing	0	0	2,990	9,452	3,445	15,887
Total Under Alternative E	54,661	458,925	473,083	115,574	19,404	1,121,647
Present Status	41,879	234,233	560,633	256,294	28,608	1,121,647

NOTE: Does not include 88 less intensively managed allotments due to data gaps in three of the eight planning units. See appendix 3 for methodology used in predicting impacts.

winter ranges. These effects would most likely be negligible except on the deer winter concentration areas listed on table 2-10 and elk winter concentration areas shown on table 2-13.

Initial elimination of spring grazing would result in immediate mule deer forage improvements. By the year 2000, however, the twenty years of favoring grasses would be becoming evident through changes in plant composition. Many grasses would become rank, with reduced palatability. However, this would not take place on areas where heavy utilization occurred in the summer and fall. Persistent old growth protects new green shoots (the most preferred stage of development for deer) during fall green-up or early the following spring.

A shift of AUMs from spring to fall use would increase livestock/wildlife competition in these areas. On the other hand, elimination of spring livestock AUMs would result in a larger forage base on which the animals would graze in the fall. The increased competition with mule deer from fall use and gradual shift from browse to grass would limit mule deer gains to 1,384 animals.

The elimination of spring and early summer livestock grazing would result in plants maturing to a later stage before curing. Since more mature plants provide less protein and lower percentages of minerals, the quality of fall and winter forage would be decreased somewhat with this alternative.

Overall, vegetation condition, density, and progression towards climax communities would improve food and cover for small mammals, birds, reptiles, and arthropods.

AQUATIC AND RIPARIAN WILDLIFE HABITAT

By changing the season of use to fall-winter, the result would be an increase in the use of woody vegetation. The woody plants associated with riparian vegetation are essential for a satisfactory riparian and aquatic community. The condition of these communities would be expected to continue to decline. All other impacts would be similar to those described for the proposed action.

Threatened and Endangered Species

All species should benefit due to the increased vegetative production and less competition for the spring forage.

Livestock Grazing

Elimination of spring and summer grazing on the 45 allotments discussed in this alternative would result in an annual loss of 20,315 AUMs of active qualifications (see table 8-20). This represents 21.4 percent of the total active qualifications on public lands in the ES area. Operators on five allotments would receive complete elimination of grazing.

Although the loss of AUMs of livestock production may be only minor to the livestock industry, it would be a major impact on most of the operators involved. Operators receiving reductions under this alternative would have to lease, rent, or purchase additional grazing land or increase use on their privately owned lands to maintain their present livestock operations. All other impacts on livestock grazing would be the same as those described for the proposed action.

Socioeconomic Conditions

INCOME

This alternative would generate income impacts basically the same as those discussed in chapter 3 for the proposed action for three sectors of the ES area economy. The three sectors where the impacts are basically the same are contract construction, government, and recreation. The only alteration in the described impacts is that the period of implementation would be extended a few years.

The income impact on range livestock related income would be different than that discussed in chapter 3. There would be 53 ranches (sizes and types indicated in table 8-24) impacted with income losses resulting from forage reductions. Six of these ranches would also be affected by elimination of grazing on six allotments every third year. Two operators not involved with forage reductions would also be affected by the elimination every third year for a total of eight ranches. The impact on these eight with elimination every third year would be the same as described in chapter 3. Table 8-25 and 8-26 include the dependency of the 55 ranches with reductions, elimination every third year, or both on BLM forage use and the criticality of that dependency. Fifty-seven families and involving 217 people would be impacted by the BLM forage use changes. As indicated in table 8-24, gross and net revenues would be changed. The combined reduction in gross revenue would be $1,334,835. This would result in a corresponding reduction of $1,067,868 in sales by other sectors of the ES area economy. This sales reduction is determined by applying the business activity multiplier of 1.8 to the change in gross revenue.

Net revenue would be reduced by a total $487,692 which would mean that there would be a corresponding indirect income reduction of $292,615 when the income multiplier of 1.6 is applied to the reduction in direct ranch income. Thus the total direct plus indirect reduction in personal income in the ES area would be $780,307, or 0.215 percent of 1976 Mesa County personal income. The capability of these ranching operations to survive income reductions of this magnitude is not known.

TABLE 8-24

RANCH SIZE AND INCOME EFFECTS

WATERSHED EFFECTIVE

Model	Cattle	Sheep	Number of Ranches	Total BLM AUM Reduction	Total Corresponding Private Land AUM Reduction	Total BLM plus Private AUM Reduction	Average AUM Reduction per Ranch	Gross Revenue Changes per Ranch	Gross Revenue Changes/All Ranches	Net Revenue Changes per Ranch	Net Revenue Changes/All Ranches
I	0 to 249		17	3,028	611	3,639	214	$-12,544	$- 213,248	$- 3,263	$- 40,154
II	250 to 549		11	4,041	2,478	6,519	593	-26,060	- 286,660	-10,233	-112,563
III	550 to 749		6	6,427	682	7,109	1,185	-71,603	- 429,618	-28,244	-169,464
IV	750 or greater		10	4,987	1,316	6,303	603	-38,997	- 389,970	-14,075	-140,750
V	0 to 220	0 to 1000	3	402	184	586	195	- 5,113	- 15,339	- 8,165	- 24,495
VI	221 to 1300	650 to 5400	4	608	40	720	180	0	0	+ 211	+ 844
VII		500 to 1249	0	0	0	0	0	0	0	0	0
VIII		1250 or greater	2	750	0	750	375	0	0	- 555	- 1,110
Total			53	20,315	5,311	25,626			$-1,334,835		-487,692

SOURCE: BLM Range Automated Data System, 1978, for ranch sizing.

NOTE: Income effects derived from analysis in appendix 12. Gross and Net revenue effects have been adjusted to compensate for the non fee payment on private AUMs. Private AUMs within allotments have been included in the ranch income analysis since their level of use changes proportionally with BLM AUMs.

TABLE 8-25

OPERATOR/RANCH DEPENDENCY ON BLM GRAZING WATERSHED EFFECTIVE

% Dependency	Number of Ranches
0 to 10	21
11 to 20	9
21 to 30	14
31 to 40	6
41 to 50	2
51 to 60	1
61 to 70	0
71 to 80	0
81 to 90	1
91 to 100	1
	55

TABLE 8-26

CRITICALITY OF OPERATOR/RANCH DEPENDENCY

ON BLM GRAZING
WATERSHED EFFECTIVE

Criticality	Number of Ranches	% of Total
High	31	56.4
Medium	16	29.1
Low	8	14.5
Total	55	100

NOTE: High means that BLM forage use is judged to be an essential element for the survival of the ranching operation. Medium means that BLM forage use may or may not be an essential survival element. Low means that BLM forage use is judged to not be essential to the ranching operation survival.

A judgmental estimate of the criticality of rancher dependency on public land grazing was made by BLM personnel by applying the following three criteria to each ranching operation:

1. Proportion of forage acquired on public land.
2. Season that forage is acquired.
3. Ease in acquiring alternate sources of forage.

It is possible that many operations would cease, with some recombining of properties occurring.

EMPLOYMENT

The employment impacts described in chapter 3 for the proposed action would apply to contract construction, government, and recreation employment, with the only alternation being an extended implementation phase. There could be a slight downward pressure on employment in the range livestock sector due to the decrease in AUM usage. There would be an estimated loss of 18.94 man years of hired ranch employment (appendix 12).

PUBLIC FINANCE AND TAX BASE

There would be a decrease in allowable use (active use qualifications) from the present level of 94,882 AUMs to 74,507 AUMs upon initiation of this alternative. This would be a reduction of 20,315 AUMs, which, when translated into animal units, would amount to about a 1,693 animal-unit reduction in the carrying capacity of area ranches. The value of area ranches associated with these losses in carrying capacity would be about $1,693,000. This could result in a decrease in the ES area tax base of about $84,650, estimated at five percent of market value. This decrease would be about 0.041 percent of the 1977 assessed evaluation for Mesa County (Colorado Dept. of Local Affairs 1977).

It should be noted that Colorado land prices reflect demand influences for land which involve considerations other than future ranch income. Therefore, the likelihood that ES area ranch property would appreciate is acknowledged. However, values of ranch property with decreased present value as a result of the allowable use reduction might be expected to increase at a slower rate than similar properties experiencing no decrease.

Tax payments for local property would be reduced by an estimated $7,863 as a result of herd size reductions on the ranches affected by BLM forage use reductions (appendix 12).

SOCIAL WELL-BEING

The social well-being of the 217 people associated with the livestock use reductions would be adversely impacted due to income losses and possible changes in their lifestyle and relative community standing. In addition, some paper losses in the value of ranches impacted by the reductions could occur. The impact on the overall social structure of the ES area would not be significant.

SOCIAL AND CULTURAL ATTITUDES

There could be some conflict with the ranching community since a traditional ES area land use would be curtailed. Those directly impacted by reductions could feel themselves deprived of opportunities to preserve what they consider to be a hard-working, independent existence.

Visual Resources

The impact of this alternative on visual resources would be the same as the proposed action.

Recreation

Impacts would be generally the same as with the proposed action. Significant increases in big game numbers, particularly for mule deer, would result in increased opportunities for hunting and sightseeing.

Wildland Areas

Impacts to wildland areas would be identical to those described for the proposal.

Air Quality

On the 21 less intensively managed allotments where spring-summer grazing would be eliminated, this alternative could allow perceptibly less suspended dust particles. Otherwise, impacts would be similar to those arising out of the proposed action.

Cultural Resources

This alternative would reduce spring and summer grazing, which would reduce possible livestock rubbing of historic sites or livestock trampling of historic sites proportionate to the number of days that livestock did not use rangelands. Decreases in erosion, particularly on 21 less intensively managed allotments, would be beneficial. Vandalism and inadvertent damage impacts would be identical to those described for the proposed action.

ALTERNATIVE F: ELIMINATION OF SPRING GRAZING

This alternative proposes the elimination of all livestock grazing during the spring growing season (defined as March 1 to May 31 for analysis purposes). The reduction in grazing would be applied to present use. In addition, allotments with stocking levels above present production would have grazing use reduced to equal present production levels.

Under this alternative, all eleven existing AMPs would continue under intensive management, with grazing systems modified to eliminate spring use. These modifications could reduce the number of pastures and range facilities needed to implement the AMPs. The eight existing AMPs not fully implemented would continue to have proposed facilities constructed as needed to implement the modified grazing plans and as funds and manpower became available.

The 78 allotments proposed for intensive management in chapter 1 would be under less intensive management, with the AMPs designating only season of use, kind of livestock, and number of AUMs. The 88 less intensively managed allotments and two elimination of grazing areas would be managed as described in the proposed action, except that spring grazing would be eliminated (see table 8-27).

The forage that would not be harvested by livestock during this period of time would be available for watershed protection and wildlife. This allocation would have to be made through the management framework plan (MFP) process.

Table 8-1 displays the reductions under this alternative for the allotments scheduled for intensive management under the proposed action). Overall, stocking levels would be reduced from 94,822 AUMs to 55,184 AUMs, a reduction of 42 percent. Eight allotments would have livestock grazing completely eliminated: Coates Creek (161), 4A Individual (755), Maluy (610), Holloway (147), Hawkins (825), Heeley (837), Brown Place (850), and Baldridge Mesa (851).

Impact Analysis

Vegetation

This alternative would result in a general improvement in range vegetation and condition. The greatest improvement would be on those areas now grazed during the spring. With no livestock grazing during this period, vegetation would be able to initiate and develop vigorous growth. Most areas would not receive any livestock use until fall, so the vegetation not grazed during the spring and summer would have ample opportunity to develop and mature.

Where livestock use was authorized in the fall, seed trampling would occur and aid in increasing seedling establishment. The increase in seedling establishment would help improve the composition and density of range vegetation. In addition, livestock grazing pressure on vegetation normally used during the fall would be reduced, since the forage not used in the spring would be available for fall grazing use. With more grasses being available for use in the fall, fall shrub use by livestock is expected to decrease and result in a slight increase in shrub vigor, though competition from increased grass production could reduce shrub composition.

This alternative would result in an overall improvement in range condition by 2000 and beyond. Annual plant production would increase slowly at first, then more rapidly as vigor, seedling establishment, and composition improved.

Fifty-nine of the 88 AMPs (16,465 acres) proposed for less intensive management in chapter 1 and the eleven existing AMP areas (281,957 acres) would have spring grazing eliminated. These allotments would show increases in production and range condition because vegetation would be allowed to complete growth and reproduction. Allotments located in or above the 14-inch precipitation zone would be most likely to show the greatest response.

The two elimination of grazing areas would respond the same as described in chapter 3. However, since grazing systems would not be implemented on the 78 areas identified in chapter 1 for intensive management, improvement on these areas would be limited because of the shortcomings of current grazing management, i.e., poor control over livestock distribution, overgrazing of some areas, etc. Table 8-28 gives the predicted changes in range condition and production for all areas as compared to the present situation.

Appendix 3 gives the methodlogy used to determine the expected vegetation response with the elimination of spring grazing alternative. Precipitation and present range condition were the parameters considered.

Threatened and Endangered Plants (Proposed)

The possiblility of proposed threatened and endangered (T/E) plants being trampled and possibly eaten by grazing animals would be reduced if livestock were removed from the range during the spring grazing season. The elimination of spring grazing would be especially helpful to any T/E plants palatable to livestock, since they would not be disturbed during the critical spring growing period.

Soils

Under this alternative, ground cover would increase (see Vegetation section). Soil compaction from livestock would lessen since trampling would not occur during spring months when the ground is wet and more vulnerable to compaction. With improved ground cover, organic matter content would increase in surface soils, resulting in improved soil structure, infiltration, permeability, porosity, and productivity. Plant vigor would improve, plant production would increase (see Vegetation section), and the net result would be reflected in the erosion condition classes. Table 8-29 presents a summary of predicted erosion condition classes under this alternative.

Water Resources

The elimination of spring grazing on all allotments would result in decreased soil compaction. Consequently, runoff and sediment yield would decrease in amounts slightly less than areas which showed decreases in table 3-10, i.e., Lipan Wash,

TABLE 8-27

LESS INTENSIVE AMPS REVISED TO ELIMINATE SPRING GRAZING

Allotment	Allotment Number	Present Use (AUMs)	Proposed Use (AUMs)
Sieber Canyon	110	48	34
Dierich Ranch	112	54	29
Gore Livestock	131a 131b 131c 131d	303	285
Moore	140	48	36
Holloway	147	14	0
Pine Ridge	151	120	116
Little Dolores Canyon	155	97	73
Cook Canyon	159	18	15
Battleship	167	78	50
Highway Ind.	204	77	66
Kannah Creek	207	105	57
Tom Casto	415	6	2
Unaweep North & South		310	167
North	417a		
South	417b		
J.L. Individual	422	37	28
EHL & West Creek	423	2	1
South Unaweep & North Unaweep	425a 425b	21	19
Turner Gulch	427	60	50
Nelson Ranch	428	175	105
Salt Wash	430	55	30
Cottonwood	431	222	115
Beeman	432	33	13
Spann	609	8	5
Carbonera Rims	614	160	67
Bear Gulch	701	58	54
Cameo Pasture	708	10	7
Conn Mountain	711	90	88
Etcheverry	720	94	54

TABLE 8-27 (Continued)

LESS INTENSIVE AMPS REVISED TO ELIMINATE SPRING GRAZING

Allotment	Allotment Number	Present Use (AUMs)	Proposed Use (AUMs)
Kimball Foothills	728	49	11
Lower Carr Creek Common	736	30	15
Homestead	740	171	52
Parks Place	743	16	10
Webber	750	32	19
Hawxhurst	804	101	43
Chalk Mountain	845	70	63
Salt Creek Common	806	78	49
Red Mountain	813	12	6
Webb Isolated Tracts	815	17	12
Clifton	817	26	13
Davis	818	34	23
Ervin	819	10	8
Gaptor	820	84	56
Fetters	821	12	10
Gipp	822	17	6
Hawkins	825	30	0
Clover Gulch Height	827a 827b	39	4
Horizon	830	14	12
Dry Kimball-Kinney	833a 833b	61	31
Lloyd	835	111	100
Long	836	45	29
Heeley	837	134	0
Milholland	840	27	9
Hittle	841	49	41
Nichols	842	11	2
Robbins	846	113	96
Brown Place	850	8	0
Molina Place East of Collbran	853a 853b	114	72
Charlesworth Isolated Tracts	855	7	4
Baldridge Mesa	851	16	0
Halfway House	823	54	45
Totals		3,895	2,407

NOTE: This table must be used in conjunction with table 8-1 to encompass all the allotments receiving reductions under this alternative.

TABLE 8-28

IMPACTS ON VEGETATION
ELIMINATION OF SPRING GRAZING

	Present[1]	Predicted[1]
Range Condition[2/] (ac.):		
Good	216,885	450,055
Fair	566,403	486,747
Poor	417,569	264,055
Production (AUMs)	109,705	126,310

NOTE: Data encompasses all public land acreage.

[1/] Methodologies used to determine present and predicted range condition and production are located in appendix 3.

[2/] Range condition refers to forage, not ecological, condition.

TABLE 8-29

IMPACTS ON SOILS
ELIMINATION OF SPRING GRAZING

Erosion Condition Classes	Acreage in each Class	
	Present	Predicted[1]
Stable	41,879	61,626
Slight	234,233	351,570
Moderate	560,633	540,370
Critical	256,294	151,915
Severe	28,608	16,166
TOTALS	1,121,647	1,121,647

NOTE: Does not include 88 less intensively managed allotments.

[1] See appendix 3 for methodology used in predicting impacts.

TABLE 8-30

RANCH SIZE AND INCOME EFFECTS

ELIMINATION OF SPRING GRAZING

Model	Cattle	Sheep	Number of Ranches	Total BLM AUM Reduction	Total Corresponding Private Land AUM Reduction	Total BLM plus Private AUM Reduction	Average AUM Reduction per Ranch	Gross Revenue Changes per Ranch	Gross Revenue Changes/All Ranches	Net Revenue Changes per Ranch	Net Revenue Changes/All Ranches
I	0 to 249		53	3,648	982	4,630	87	$- 5,093	$- 269,929	$- 1,320	$- 69,960
II	250 to 549		24	7,814	3,337	11,151	495	-20,492	- 491,808	- 8,081	-193,944
III	550 to 749		9	7,803	1,711	9,514	1,057	-63,735	- 573,615	-25,060	-225,540
IV	750 or greater		14	14,896	1,898	16,794	1,200	-75,887	-1,062,418	-28,415	-397,810
V	0 to 220	0 to 1000	5	1,125	626	1,751	350	- 9,517	- 47,585	-14,994	- 74,970
VI	221 to 1300	650 to 5400	4	2,290	228	2,518	630	+ 86	+ 344	+ 773	+ 3,092
VII		500 to 1249	3	592	175	767	256	-14,329	- 54,987	-10,710	- 32,130
VIII		1250 or greater	2	1,470	162	1,632	816	+ 122	+ 244	- 1,086	- 2,172
Total			114	39,638	9,119	48,757			$-2,499,754		-993,434

SOURCE: BLM Range Automated Data System, 1978, for ranch sizing.

NOTE: Income effects derived from analysis in appendix 12. Gross and Net revenue effects have been adjusted to compensate for the non fee payment on private AUMs. Private AUMs within allotments have been included in the ranch income analysis since their level of use changes proportionally with BLM AUMs.

E. Salt Creek, Cone Mountain, Little Horsethief, and Pollock Canyon. The result would be a net decrease in runoff (<680 acre feet) and sediment yield (< 184,000 tons) for the entire ES area and an overall improvement in water quality and watershed conditions. Salinity would not change significantly because decreased runoff and salt loading from saline areas would be offset by decreases in good quality runoff from nonsaline areas.

Ground water and ground water quality is not expected to change because increased vegetation would use any additional soil moisture before recharge occurred.

Wildlife

TERRESTRIAL WILDLIFE

Elimination of spring livestock grazing on the allotments listed in tables 8-1 and 8-27 would reserve forage for wildlife during the critical spring green-up. This would include most of the 156,000 acres which comprise concentrated deer and elk winter use areas. This would likely result in improved forage vigor and cover and a probable shift in species composition to more grass at the expense of browse.

The reduction in AUMs and improved overall vegetation would be beneficial to wildlife. The expected decrease in browse would reduce the quality of deer winter ranges. On the other hand, increases in grass would increase the quality of elk winter ranges. These effects would most likely be negligible except on the deer winter concentration areas shown on table 2-3. Adverse impacts on deer areas would include increased mortality, decreased natality, and possible changes in herds' population structures.

Initial elimination of spring grazing would result in immediate mule deer forage improvements. By the year 2000, however, the twenty years of favoring grasses would be becoming evident through changes in plant composition. Many grasses would become rank, which reduces palatability. However, this would not take place on areas where heavy utilization occurred in the summer and fall. Persistent old growth protects new green shoots (the most preferred stage of development for deer) during fall green-up or early the next spring. Overall, mule deer winter carrying capacity would be expected to decrease slightly.

The lack of grazing systems would eliminate the potential benefits of grazing treatments, such as provisions for increased seed trampling and yearlong rest for seedling establishment. Without these treatments, establishment of new plants would be slowed, particularly in the more favored or heavily used livestock areas. Heavily used or overgrazed areas would continue to deteriorate due to the lack of control over livestock movements which would exist under this alternative.

The elimination of spring and early summer livestock grazing would result in plants maturing to a later stage before curing. Since more mature plants provide less protein and lower percentages of minerals, the quality of fall and winter forage would be decreased somewhat.

Overall, vegetative condition, density, and progression towards climax communities would improve food and cover for small mammals, birds, reptiles, and arthropods.

AQUATIC AND RIPARIAN WILDLIFE HABITAT

Under this alternative, there would be some improvement in the aquatic and riparian habitat over the existing conditions on those allotments having reductions. On the eight allotments where livestock grazing would be eliminated, conditions would improve significantly and pregrazing conditions should be reached by 2000.

Threatened and Endangered Species

Impacts to threatened and endangered species would be the same as those occurring with the proposed action, with one exception: the peregrine falcon prey base, consisting of small birds, would not increase significantly over that which exists at present (due to the lack of intensive grazing management and vegetation manipulation treatments on pinyon-juniper.)

Livestock Grazing

This alternative would reduce active qualifications from 94,822 AUMs to 55,184 AUMs, a decrease of 39,638 AUMs. This loss represents 41.8 percent of the total active qualifications on public lands in the ES area. The reductions would involve the 11 existing intensive AMPs, 66 of the proposed 78 intensive AMPs, 59 of the proposed 88 less intensive AMPs, and the two elimination of grazing areas and would affect 108 livestock operators, 8 of whom would receive complete elimination of grazing. (See the Socioeconomic section for the economic impacts on these operators.) The decrease in the operators' total qualifications would lower the value of their base property, to which the federal grazing privileges are attached. These livestock operators would become more dependent on other lands for livestock forage during the spring grazing season (March 1 to May 31). If other lands the operators own, rent, or lease were not capable of supporting the 39,638 AUMs removed from public lands, some operators would probably have to buy, rent, or lease additional pasturage or sell some of their livestock.

Available data indicates that the remaining 12 intensive AMPs and 29 less intensive AMPs would receive no reductions in livestock use.

Present grazing practices would be retained, except for the elimination of spring grazing and the possibility of some operators being allowed to change their kind of livestock. Poor livestock distribution due to insufficient livestock water sources and control facilities (fences, cattleguards, etc.), would continue to result in underutilization of some areas and overutilization of favored livestock concentration areas.

The loss of the two aforementioned elimination of grazing areas, Sewemup Mesa and the 885 acres of the GML Allotment along the Dolores River, would have only a slight impact on livestock grazing. The Dolores River area involves the loss of 1 AUM and Sewemup Mesa the loss of 24 AUMs, resulting in a total reduction of 25 AUMs of active qualifications.

The overall impact on livestock grazing would be a loss of 39,638 AUMs, an adverse impact to livestock operators. In addition, there would be an unquantifiable increase in livestock quality (weight gains) on those areas expected to show improvement in range condition (see Vegetation section).

Socioeconomic Conditions

INCOME

Ongoing trends for contract construction-related, government-related, and recreation-related income would not be altered by of this alternative.

Range livestock-related income would be affected with an immediate reduction resulting from reduced grazing on allotments. This would result in long-term impacts to 118 families on 114 ranches (some ranches support more than one family). The size and type of ranches are indicated in table 8-30. Relative dependency of these ranches on BLM grazing and the criticality of that dependency are indicated in tables 8-31 and 8-32.

As indicated in table 8-30, there would be reductions in both gross and net incomes.

Gross income for all ranches would be reduced a total of $2,499,754 which would reduce sales by other sectors of the ES area economy by an estimated $1,999,803 when the business activity multiplier of 1.8 is applied to the gross income reduction.

Net income for all ranches would be reduced by a total of $99,434 which would result in a combined direct plus indirect income reduction of $1,589,494 when the income multiplier of 1.6 is applied to the direct income reductions. This total reduction in personal income would be 0.437 percent of 1976 Mesa County personal income.

Some ranching operations could cease as a result of the net revenue reductions outlined in table 8-30 per ranch size and type. Some recombining of properties could also occur.

EMPLOYMENT

Ongoing trends for contract construction, recreation, and government-related employment would not be affected. An estimated 35.78 man years of hired ranch employment would be lost (appendix 12).

PUBLIC FINANCE AND TAX BASE

Allowable use (active use qualifications) would be reduced from 94,882 AUMs to 55,184 AUMs. This reduction of 39,638 AUMs would translate into a reduction of 2,768 animals units of carrying capacity for the 108 ranches affected. The decrease of 2,768 animal units of allowable use would result in a decrease in the ranches present value of about $2,768,000.

The decrease in the market value of the 114 ranches would also involve the tax base. It is possible that the ES areas tax base could be decreased by about $138,400 (assessed at 5 percent of market value). This decrease would be 0.067 percent of the 1977 Mesa County assessed valuation (Colorado Department of Local Affairs 1977).

It should be noted that Colorado agricultural land prices reflect demand influences for land which involve considerations other than future ranch income. Therefore, the likelihood that ES area ranch property would appreciate is acknowledged. However, values of ranch property with decreased present value as a result of grazing qualification losses might be expected to increase at a slower rate than those similar properties experiencing no decrease.

Local property taxes paid by ranches would decrease by an estimated $14,851 as a result of livestock herd reductions (appendix 12).

SOCIAL WELL-BEING

There would be an adverse impact on the social well-being of 118 ranching families due to expected income losses. The possibility exists that, as a result of these income losses, some operations could go out of business. In addition, some occupational dislocations could occur if some operators were forced out of business. There would be paper losses in the value of base properties associated with reductions.

Taken together, these considerations indicate a major impact for a group of livestock operators and their families in the ES area, though the impact on the overall social structure would be negligible.

TABLE 8-31

OPERATOR/RANCH DEPENDENCY ON BLM GRAZING ELIMINATION OF SPRING GRAZING

% Dependency	Number of Ranches
0 to 10	52
11 to 20	20
21 to 30	16
31 to 40	10
41 to 50	10
51 to 60	2
61 to 70	0
71 to 80	1
81 to 91	2
91 to 100	1
Total	114

TABLE 8-32

CRITICALITY OF OPERATOR/RANCH DEPENDENCY ON BLM GRAZING ELIMINATION OF SPRING GRAZING

Criticality	Number of Ranches	% of Total
High	47	41.2
Medium	38	33.3
Low	29	25.5
Total	114	100

NOTE: High means that BLM forage use is judged to be an essential element for the survival of the ranching operation. Medium means that BLM forage use may or may not be an essential survival element. Low means that BLM forage use is judged to not be essential to the ranching operation survival.

A judgmental estimate of the criticality of rancher dependency on public land grazing was made by BLM personnel by applying the following three criteria to each ranching operation:

1. Proportion of forage acquired on public lands.
2. Season that forage is acquired.
3. Ease in acquiring alternate sources of forage.

SOCIAL AND CULTURAL ATTITUDES

The reduced public land use for range livestock grazing would conflict with attitudes and values held by the ranching community in the ES area. For example, they consider livestock grazing a justifiable, traditional land use. Those directly impacted by the reductions could feel themselves deprived of the opportunity to pursue what they consider to be a hard-working, independent existence.

VISUAL RESOURCES

Impacts on the 11 existing AMPs would be similar in nature to those occurring on the 78 proposed intensive management AMPs (see chapter 3), though the magnitude would be considerably less. No other impacts would occur.

Recreation

Impacts on the 11 existing AMPs would be similar in nature to those described for the 78 intensive management AMPs in chapter 3, though they would occur on a much smaller scale. Increases in deer and elk populations would lead to increased opportunities for hunting and sightseeing.

Wildland Areas

There would be no adverse impacts under this alternative.

Air Quality

The elimination of spring grazing would result in an areawide increase in vegetation ground cover. This, in turn, would result in less airborne particulates, which would represent an increase in air quality. This increase would be greatest over the eleven existing AMPs, where intensive grazing management would further enhance vegetation response to eliminated spring grazing.

Cultural Resources

Impacts on the 11 existing AMPs would be similar in nature to those occurring on the 78 intensive management AMPs under the proposal (see chapter 3), with vandalism and inadvertent damage occurring during completion of the 8 partially implemented AMPs. Vandalism and inadvertent damage would remain about the same as they are at present over the rest of the ES area.

This alternative would eliminate grazing from March 1 to May 31, which would reduce possible livestock rubbing and trampling of historic sites proportionate to the number of days that livestock did not use rangelands. Decreased erosion resulting from the favorable vegetation response would constitute a beneficial impact.

Summary

Table 8-33 presents a summary of the impacts of the proposed action as compared with the alternatives. The table shows both quantified impacts and a summary ranking.

TABLE 8-33

IMPACT SUMMARY

Resource or Component	Unit	Present Status	Proposed Action	Alternative A: No Action	Alternative B: Continuation of Present Grazing Management	Alternative C: Elimination of Grazing	Alternative D: Wildlife Effective	Alternative E: Watershed Effective	Alternative F: Elimination of Spring Grazing
Vegetation									
Range Condition	Acres		(3)*	(7)	(6)	(5)	(2)	(1)	(4)
Good		216,885	+358,510	- 24,201	+ 56,473	+225,894	+365,073	+404,359	+233,170
Fair		566,403	-107,448	- 60,926	- 24,927	-162,302	-110,597	- 92,597	- 79,656
Poor		417,569	-251,062	+ 85,127	- 31,546	- 63,092	-254,476	-311,762	-153,514
Production	AUMs	109,705	+ 11,704	- 23,436	+ 0	+ 11,704	+ 26,265	+ 19,336	+ 16,605
Soils									
Erosion Condition Classes1/	Acres		(2/3/4)	(7)	(6)	(2/3/4)	(2/3/4)	(1)	(5)
Stable		50,174	+ 11,263	+ 0	+ 1,509	+ 11,263	+ 11,263	+ 12,782	+ 19,747
Slight		254,948	+208,602	+ 17,175	+ 48,583	+208,602	+208,602	=224,692	+117,337
Moderate		588,525	- 87,508	+ 11,279	- 8,228	- 87,508	- 87,508	- 87,550	- 20,263
Critical		278,502	-125,804	- 24,499	- 37,909	-125,804	-125,804	-140,720	-104,379
Severe		28,708	- 6,553	- 3,955	- 3,955	- 6,533	- 6,553	- 9,204	- 12,442
Water Resources2/									
Salinity (Total dissolved solids)	Milligrams/liter3/	(6) 937.9	(5) + .005	(6) + 0	(4) + 0	(1) - .049	(7) <+ .005	(2) - .043	(3) + 0
Total Seasonal Runoff	Acre-feet								
Hill Slope Erosion4/	1000 tons.	4,150	+ 15	> +15	+ 0	- 790	>+ 15	- 680	<- 680
		8,700	+ 0	> + 1	+ 0	> - 184	> .1	- 184	<- 184
Wildlife: Terrestrial									
Wildlife use	AUMs	27,049	(3)	(7)	(6)	(2)	(1)	(4)	(5)
Populations	Animal Numbers		+ 3,653	+ 350	+ 794	+ 3,670	+ 4,750	+ 3,502	+ 2,462
Mule Deer		32,759							
Elk		1,986	+ 1,457	+ 131	+ 291	+ 1,384	+ 1,821	+ 1,384	+ 961
			+ 13	+ 3	+ 8	+ 15	+ 17	+ 15	+ 13
Wildlife: Aquatic & Riparian									
Riparian Habitat	Miles		(5)	(7)	(6)	(2)	(1)	(3)	(4)
Excellent		4.5	+ 0	Insignificant change from present status	Insignificant change from present status	Significant improvement (to prelivestock condition)	Significant improvement over present status	Significant improvement over present status	Improvement over present status
Good		73.9	+ 33.0						
Fair		52.2	- 6.8						
Poor		50.8	- 26.2						

TABLE 8-33

IMPACT SUMMARY

Resource or Component	Unit	Present Status	Proposed Action	Alternative A: No Action	Alternative B: Continuation of Present Grazing Management	Alternative C: Elimination of Grazing	Alternative D: Wildlife Effective	Alternative E: Watershed Effective	Alternative F: Elimination of Spring Grazing
Aquatic Habitat	Miles			Insignificant change from present status	Insignificant change from present status	Significant improvement (to prelivestock condition)	Significant improvement over present status	Significant improvement over present status	Improvement over present status
Excellent		6.1	+ 0						
Good		16.1	+ 10.7						
Fair		46.9	+ 8.6						
Poor		108.3	- 19.3						
Livestock Grazing									
Active qualifications	AUMs	94,822	(2/3) - 12,683	(1) + 0	(2/3) - 12,683	(7) - 94,822	(5) - 27,244	(4) - 20,315	(6) - 39,638
Socioeconomic Conditions			(2)	(1)	(3)	(7)			
Personal Income	Dollars	363,340,000	+112,478	0	- 454,626	- 3,502,352	-953,156	-602,101	-1,589,494
Employment5/	Person Years	32,187	+ 12.70	0	- 10.52	- 63.15	- 10.57	- 4.96	- 35.78
Tax Base6/	Dollars	14,885,434	- 533	0	- 4,368	- 29,121	- 10,192	- 7,863	- 14,851
Net Revenue Changes per Ranch	Dollars								
Model I		- 2,881	- 2,381 9/	- 2,881	- 2,381	- 4,808	- 3,855	- 3,263	- 1,320
Model II		+ 3,586	- 3,157	+ 3,586	- 3,157	-14,637	- 6,553	-10,233	- 8,081
Model III		+18,071	-68,703	+18,071	-68,703	-38,480	-34,555	-28,244	-25,060
Model IV		+61,097	- 8,326	+61,097	- 8,326	-66,435	-13,845	-14,075	-28,415
Model V		+ 5,466	- 8,151	+ 5,466	- 8,151	- 9,354	-37,148	- 8,165	-14,994
Model VI		+62,737	- 204	+62,737	+ 204	+ 3,282	+ 413	+ 211	+ 773
Model VII		+ 2,279	0	+ 2,279	0	- 9,123	-21,427	0	-10,710
Model VIII		+10,986	- 555	+10,986	- 555	-36,153	- 1,604	- 555	- 1,086

NOTE: The point of reference for the proposed action and all alternatives is the year 2000.

* Rankings range from 1 (least adverse or most beneficial impact) to 7 (most adverse or least beneficial impact).

1/ Does not include 88 less intensive AMPs.

2/ > = greater than and < = less than.

3/ At Imperial Dam.

4/ Does not include channel erosion.

5/ This is a summary of impacts on the ES area economy resulting from implementing the proposed action or alternatives. The numbers given for the proposed action and alternatives represent directional changes in the three economic indicators, while the present status indicates a base from which to assess the relative importance of the changes. The changes indicated are those that are expected after the implementation phase of the alternatives or by the year 2000 for the proposed action.

6/ The present status base is 1976 Mesa County personal income.

7/ The present status base is the May 1978 Mesa Co. labor force expressed in people while the changes for the proposed action and alternatives are expressed in person years.

8/ The present status base is 1977 Mesa Co. local tax revenue.

CHAPTER 9

CHAPTER 9

CONSULTATION AND COORDINATION

The Grand Junction Grazing Environmental Statement (ES) team was established on 1 October 1977 in the Grand Junction District Office of the Bureau of Land Management (BLM). Specialists with expertise in various disciplines made up the team.

History of Coordination Efforts

A meeting was held on November 17, 1977 with livestock operators to explain the background and significance of the allotment management plans (AMPs) and the environmental statement. This explanation included the court action and subsequent agreement.

Coordination in Development of the Proposed Action

From early 1976 through 1977, the AMP writers continued to meet with livestock operators to determine their future needs in the ES area and to review the proposed AMPs.

The AMPs were completed in June 1977 and reviewed by specialists in the Grand Junction District BLM Office. During the summer of 1977, livestock operators and public interest groups expressed their views on the AMPs.

Consultation and Coordination in Preparation of the DES

On 9 October 1977, a news release was issued stating the BLM's plan for initiating and completing the environmental statement. The following media received this news release: one television station, eight radio stations, and six newspapers throughout western Colorado.

At the same time, letters detailing the preparation and purpose of the Grand Junction Grazing ES were sent to twelve educational institutions; six wildlife interest groups; eleven environmental groups; ten livestock organizations, in addition to each of the livestock permittees within the ES area; three energy firms or organizations; nineteen recreational interest groups; eight city or county governmental agencies, both in Colorado and Utah; eleven federal agencies; and fifty-two interested individual citizens.

During the May and December 1978 Grand Junction District Grazing Advisory Board meetings, the team leader explained the background of the ES and reported on its progress.

On June 16, 1978 a formal consultation report was received from the U.S. Fish and Wildlife Service stating that no adverse impacts were expected on threatened or endangered species as a result of the proposed action. This was accomplished in accordance with section 7 of the Endangered Species Act.

All ES-related statements and text are on file in the Grand Junction District Office.

Further comments are expected from the public through formal statements as well as informal and public meetings. During the preparation of the ES, many individuals, agencies, and organizations with special knowledge and expertise were consulted. A listing of these consultations is found in table 9-1.

Agencies and organizations that have been requested to comment on the draft include:

Federal Agencies

- Department of the Interior
  - Geological Survey
  - Bureau of Reclamation
  - Fish and Wildlife Service
  - National Park Service
  - Heritage Conservation and Recreation Service
- Department of Agriculture
  - Forest Service
  - Soil Conservation Service
- Department of Energy
- Environmental Protection Agency
- Advisory Council on Historic Preservation

Colorado State Agencies

- Office of the Governor
- Colorado Division of Planning-State Clearing House (Distributes to State Agencies)
- State Historical Society of Colorado (SHPO)

Utah State Agencies

- Office of the Governor
- Utah Division of Planning-State Clearing House (Distributes to State Agencies)

TABLE 9-1

CONTACTS

AGENCY, INSTITUTION, OR ORGANIZATION CONTACTED	NATURE OF CONTACT	RESPONSE RECEIVED	ACTION TAKEN
U.S. Environmental Protection Agency	Requested data on air quality.	Yes	Furnished data through personal contact and publications.
U.S. Geological Survey Conservation Division	Requested data on air quality.	Yes	Furnished data through personal contact and publications.
Soil Conservation Service	AMP coordination. Requested soil data.	Yes	Coordination carried out through personal contact; furnished data through personal contact and correspondence.
U.S. Geological Survey Water Resources Division	Requested ground water quality analysis.	Yes	Furnished data through contracted report.
Bureau of Reclamation	Requested data on the impacts of grazing on cultural resources and paleontology, and ground water information.	Yes	Furnished data through correspondence and personal contacts.
U.S. Forest Service	Requested data on the impacts of grazing on cultural resources and paleontology, and grazing coordination.	Yes	Furnished data through correspondence and personal contacts.
National Park Service	Requested data on the impacts of grazing on cultural resources and paleontology.	Yes	Furnished data through correspondence and personal contacts.
Department of Historic Preservation	Requested data on the impacts of grazing on cultural resources and paleontology.	Yes	Furnished data through correspondence.
Council of Historic Preservation	Requested data on the impacts of grazing on cultural resources and paleontology.	Yes	Furnished data through correspondence.
U.S. Fish & Wildlife Service	Consultation on	Yes	Furnished biological opinion that proposed

TABLE 9-1 (Continued)

CONTACTS

AGENCY, INSTITUTION, OR ORGANIZATION CONTACTED	NATURE OF CONTACT	RESPONSE RECEIVED	ACTION TAKEN
	impacts to T/E species, Section 7, Endangered Species Act.		action will not jeopardize the T/E species.
Agricultural Research Service	Requested data on ground water.	Yes	Furnished data through personal contact.
Bureau of Land Management Lewistown, Montana	Requested photos of sage grouse.	Yes	Furnished requested photographs.
Bureau of Land Management Montrose, Colorado	Requested data on livestock grazing, wildlife, and fisheries.	Yes	Furnished data through correspondence and personal contact.
Bureau of Land Management Denver Service Center	Requested data on air quality.	Yes	Furnished data through personal contact, publications, and printouts.
Bureau of Land Management Moab, Utah	AMP coordination. Requested data on visual resources.	Yes	Coordination carried out through personal contact and correspondence.
Colorado Division of Wildlife	Requested data on game populations, areas of use, browse conditions, and fisheries.	Yes	Furnished data through correspondence and personal contact.
Colorado Division of Parks & Outdoor Recreation	Requested data on recreation.	Yes	Furnished data through personal contact.
Colorado Department of Health Air Pollution Control Division	Requested data on air quality.	Yes	Furnished data through personal contact and publications.
Office of State Archaeologist Colorado	Requested data on the impacts of grazing on cultural resources and paleontology.	Yes	Furnished data through correspondence.
Colorado State Highway Department	Requested data on the impacts of grazing on cultural resources and paleontology.	Yes	Furnished data through correspondence.
State Historical Society of Colorado	Requested data on the impacts of grazing on cultural resources and paleontology.	Yes	Furnished data through correspondence.
Colorado Division of Wildlife Research Center	Requested copies of Quarterly Research Reports.	Yes	Furnished data through publications.

TABLE 9-1 (Continued)

CONTACTS

AGENCY, INSTITUTION, OR ORGANIZATION CONTACTED	NATURE OF CONTACT	RESPONSE RECEIVED	ACTION TAKEN
Utah Department of Game and Fish	Requested data on game populations, areas of use, browse conditions and fisheries.	Yes	Furnished data through correspondence and literature.
Utah Division of Wildlife Resources	Requested data on wildlife use on Utah allotments.	Yes	Furnished data through correspondence and publications.
Mesa County Health Department - Air Pollution Control Division	Requested data on air quality.	Yes	Furnished data through personal contact and publications.
Tri-River Extension	Requested data on livestock grazing industry.	Yes	Furnished data through personal contact.
Mesa County Government Planning Commission	Requested data on projected growth of Grand Junction.	Yes	Furnished data through personal contact.
Mesa County Assessor's Office	Requested livestock grazing information.	Yes	Furnished data through personal contact.
Historical Museum and Institute of Western Colorado	Requested data on the impacts of grazing on cultural resources and paleontology.	Yes	Furnished data through correspondence.
University of Colorado	Requested data on the impacts of grazing on cultural resources and paleontology.	Yes	Furnished data through correspondence.
Colorado State University	Requested data on the impacts of grazing on cultural resources and paleontology.	Yes	Furnished data through correspondence.
Steven Baker Consulting Archaeologist	Requested data on the impacts of livestock grazing on cultural resources and paleontology.	Yes	Furnished data through correspondence.
Gordan-Kranzush Archaeological Consultants	Requested data on the impacts of livestock grazing on cultural resources and paleontology.	Yes	Furnished data through correspondence.
Adams State College	Requested data on the impacts of livestock grazing on cultural	Yes	Furnished data through correspondence.

TABLE 9-1 (Continued)

CONTACTS

AGENCY, INSTITUTION, OR ORGANIZATION CONTACTED	NATURE OF CONTACT	RESPONSE RECEIVED	ACTION TAKEN
	resources and paleontology.		
Utah State University	Requested training in use of Grazing Impact Model.	Yes	Training provided through personal contact.

Local Government

Mesa, Garfield, and Montrose County Commissioners and Planning Commission

Other Organizations

Ada County Fish and Game League
Appaloosa Club
Colorado Arabian Horse Club
Colorado Association of Soil Conservation Districts
Colorado Cattlemen's Association
Colorado Farm Bureau
Colorado Four Wheel Drive Clubs
Colorado Guides and Outfitters Association
Colorado Mining Association
Colorado Open Space Council
Colorado Parks and Recreation Society
Colorado Rivers Council
Colorado Sportsmen Association
Colorado Wildlife Association
Colorado Wildlife Federation
Colorado Wool Grower's Association
Environmental Defense Fund
Greenbelt, Inc.
Izaak Walton League of America
National Audubon Society
National Council of Public Land Users
Natural Resources Defense Council
Nevada Outdoor Recreation Association
Oregon Environmental Council
Pacific Legal Foundation
Sierra Club
Society for Range Management
Target Shooters
Trout Unlimited
Western Colorado Sportsmen
The Wilderness Society

Individuals

James Morgan
Dick Loper

APPENDIX 1

TABLE A1-1

SPECIFIC OBJECTIVES OF THE PROPOSED ALLOTMENT MANAGEMENT PLANS (INTENSIVE)

By Year 2000

Allotment Name and Number	Wildlife Habitat (Major Species)	Erosion Condition Class			Livestock Forage Production on Public Lands	Vegetation (Major Vegetative Sub-Type in Allot.)	Livestock Forage Condition Class		
			Present % Acres	Future % Acres				Present % Acres	Future % Acres
Fish Park 101	Improve deer habitat by resting every third year.	Stable - Slight - Moderate- Critical- Severe -	29% 19% 47% 4% 1%	29% 19% 47% 4% 1%	Increase AUM's from 325 to 570.	Increase Crested Wheatgrass from 5% to 10% Needle & thread and Indian ricegrass from 10% to 20%.	Good Fair Poor	30 70 0	65 35 0
Haystack 103	Improve wildlife habitat.	Stable - Slight - Moderate- Critical- Severe -	0% 25% 75% 0% 0%	0% 25% 75% 0% 0%	Maintain 153 AUMs.	Maintain density at 30% and composition of grasses at 20-25%.	Good Fair Poor	0 100 0	50 50 0
South of the Road 105	Improve wildlife habitat.	Stable - Slight - Moderate- Critical- Severe -	0% 0% 0% 81% 19%	0% 81% 0% 19% 0%	Increase AUM's from 48 to 54.	Increase cover of Western & Crested wheatgrass from 1% to 25%.	Good Fair Poor	0 99 1	50 50 0
East Toms Cyn 106	Improve wildlife habitat.	Stable - Slight - Moderate- Critical- Severe -	0% 30% 41% 22% 7%	0% 60% 11% 22% 7%	Reduce utilization in Pasture B. Maintain 205 AUMs.	Maintain Crested wheatgrass composition. Increase density from 1% to 20%.	Good Fair Poor	52 48 0	76 24 0
Longshore Longshore Above Rim 108 Longshore Below Rim 109 McKenzie 111	Improve wildlife habitat.	Stable - Slight - Moderate- Critical- Severe -	0% 36% 48% 16% 0%	0% 36% 48% 16% 0%	Improve Sagebrush stand conditions. Increase AUM's from 274 to 565.	Improve browse conditions. Reduce use on Sagebrush.	Good Fair Poor	2 87 11	45 49 6
Fessler 113	Provide 100 AUMs for deer.	Stable - Slight - Moderate- Critical- Severe -	0% 0% 0% 100% 0%	0% 0% 100% 0% 0%	Increase AUMs from 35 to 53.	Improve browse condition.	Good Fair Poor	0 100 0	50 50 0

TABLE A1-1 (Continued)

SPECIFIC OBJECTIVES OF THE PROPOSED ALLOTMENT MANAGEMENT PLANS(INTENSIVE)

By Year 2000

Allotment Name and Number	Wildlife Habitat (Major Species)	Erosion Condition Class Present % Acres	Erosion Condition Class Future % Acres	Livestock Forage Production on Public Lands	Vegetation (Major Vegetative Sub-Type in Allot.)	Livestock Forage Condition Class	Present % Acres	Future % Acres
Spring Creek 115	Improve wildlife habitat.	Stable - 0% Slight - 16% Moderate- 63% Critical- 20% Severe - 1%	0% 63% 16% 20% 1%	Increase livestock AUMs from 165 to 382.	Increase Crested wheatgrass from 1% to 15%, Mtn. mahogany & Bitterbrush from 1% to 5%.	Good Fair Poor	10 80 10	50 45 5
Bangs Canyon Bangs Cyn 116 Files 117 Deadhorse 119 Landini 120 Notch Spring 121 Clarks Bench 122 Upper Bench 123	Improve wildlife habitat.	Stable - 0% Slight - 9% Moderate- 91% Critical- 0% Severe - 0%	0% 89% 11% 0% 0%	Increase livestock AUMs from 2458 to 2962.	Increase Galleta grass from 2% to 18%, Indian ricegrass from 2% to 10%, Western wheatgrass from 2% to 10%.	Good Fair Poor	95 0 5	92 4 4
Aubert Brothers Lower Bench 125 28 Hole 126 Duval 127 Skinner 128 Snyder Flats 129	Improve deer habitat by limiting use on browse to 50%.	Stable - 4% Slight - 3% Moderate- 68% Critical- 25% Severe - 0%	7% 60% 8% 25% 0%	Increase livestock forage from 1919 to 2058.	Increase Indian ricegrass, Galleta grass, Needlegrass. Limit browse use to 50%.	Good Fair Poor	6 71 23	44 48 8
Colorado-Black Ridge Co. Ridge 130 Black Ridge 138	Improve deer habitat by limiting use on browse to 50%.	Stable - 0% Slight - 0% Moderate-100% Critical- 0% Severe - 0%	0% 64% 36% 0% 0%	Increase AUMs from 1118 to 1185.	Increase Indian ricegrass from 2% to 10%, Galleta grass from 8% to 10%, Sand dropseed & Bluegrass from 1% to 5%.	Good Fair Poor	6 64 30	38 47 15
Reservation 133	Improve wildlife habitat.	Stable - 0% Slight - 100% Moderate- 0% Critical- 0% Severe - 0%	30% 70% 0% 0% 0%	Maintain livestock forage at present level of 122 AUMs.	Increase Crested wheatgrass from 13% to 15%. Limit browse use to 40%.	Good Fair Poor	0 0 100	0 50 50
Knowles-Little Dolores Bench Little Dolores Bench 135 Knowles 136	Improve deer habitat by limiting use on browse to 50%.	Stable - 0% Slight - 19% Moderate- 81% Critical- 0% Severe - 0%	0% 100% 0% 0% 0%	Maintain 331 AUMs.	Increase Galleta grass, Needlegrass, Indian ricegrass, Western wheatgrass all from 5% to 10%. Reduce Cactus & Snakeweed.	Good Fair Poor	0 2 98	1 50 49
Timber Ridge 137	Improve deer habitat by limiting use on browse to 50%	Stable - 0% Slight - 49% Moderate- 40%	24% 54% 20%	Maintain livestock forage at present level of 221 AUM's	Increase: Crested wheatgrass from 19% to 25%, Junegrass	Good Fair Poor	58 0 42	58 42 0

TABLE A1-1 (Continued)

SPECIFIC OBJECTIVES OF THE PROPOSED ALLOTMENT MANAGEMENT PLANS(INTENSIVE)

Timber Ridge 137 Improve deer habitat by limiting use on browse Stable - 0% 24% Slight - 49% 54% Maintain livestock forage at present Increase: Crested wheatgrass from 19% Good 58 Fair 0 Poor 42 58 42 0

TABLE A1-1 (Continued)

SPECIFIC OBJECTIVES OF THE PROPOSED ALLOTMENT MANAGEMENT PLANS(INTENSIVE)

By Year 2000

Allotment Name and Number	Wildlife Habitat (Major Species)	Erosion Condition Class	Present % Acres	Future % Acres	Livestock Forage Production on Public Lands	Vegetation (Major Vegetative Sub-Type in Allot.)	Livestock Forage Condition Class	Present % Acres	Future % Acres
		Critical- Severe -	2% 0%	2% 0%		from 2% to 8%.			
Three Canyons Burke 141 Co. River 142 Radio Tower 143	Improve deer habitat by limiting use on browse to 50%. Increase amount of riparian habitat along Colo. River.	Stable - Slight - Moderate- Critical- Severe -	22% 0% 0% 78% 0%	22% 0% 19% 59% 0%	Increase livestock forage from 472 to 504 AUMs.	Increase Indian ricegrass from 5% to 20%, limit utilization to 50%.	Good Fair Poor	0 100 0	50 50 0
Dugway Palisade Point 145 Dugway 403 Beaver Mesa 404 Gateway	Improve deer habitat by limiting use on browse to 50%. Fence riparian habitat along Dolores River.	Stable - Slight - Moderate- Critical- Severe -	0% 31% 43% 26% 0%	0% 31% 43% 26% 0%	Increase livestock forage from 314 to 554 AUMs.	Limit use on browse to 50%. Fence riparian habitat along Dolores River.	Good Fair Poor	1 36 63	18 50 32
Thompson-Northeast Creek Thompson 148 Northeast Creek 156	Improve wildlife habitat.	Stable - Slight - Moderate- Critical- Severe -	0% 0% 9% 91% 0%	0% 0% 44% 56% 0%	Increase AUMs from 134 to 738.	Increase Crested wheatgrass to 30%.	Good Fair Poor	8 92 0	54 46 0
Meinhart 150	Improve deer habitat by limiting browse use to 50%.	Stable - Slight - Moderate- Critical- Severe -	0% 37% 36% 27% 0%	0% 37% 36% 27% 0%	Increase AUMs from 80 to 130.	Maintain present density & composition.	Good Fair Poor	0 100 0	88 12 0
Round Knob 152	Maintain deer habitat by limiting use on browse to 50%.	Stable - Slight - Moderate- Critical- Severe -	0% 0% 100% 0% 0%	0% 0% 100% 0% 0%	Maintain 342 AUMs for livestock.	Increase Galleta grass from 6% to 10%, Indian ricegrass from 1% to 10%, Sandbury bluegrass from 1% to 5%.	Good Fair Poor	100 0 0	100 0 0
Lost Canyon-Sugar Bench Lost Canyon 154 Sugar Bench 848	Maintain wildlife habitat.	Stable - Slight - Moderate- Critical- Severe -	9% 6% 31% 54% 0%	9% 21% 54% 16% 0%	Increase livestock forage from 1936 to 2791 AUMs.	Limit use on browse to 50%.	Good Fair Poor	18 38 44	37 41 22
Boulder Canyon-Ladder Canyon Boulder Canyon 157 Ladder Canyon 158	Improve deer habitat by increasing Sagebrush from 5% to 8%.	Stable - Slight - Moderate- Critical- Severe -	0% 60% 19% 21% 0%	0% 60% 19% 21% 0%	Increase AUMs from 274 to 440.	Maintain all grasses at present level, increase Indian ricegrass from 1% to 5%.	Good Fair Poor	0 55 45	3 50 47

TABLE A1-1 (Continued)

SPECIFIC OBJECTIVES OF THE PROPOSED ALLOTMENT MANAGEMENT PLANS(INTENSIVE)

By Year 2000

Allotment Name and Number	Wildlife Habitat (Major Species)	Erosion Condition Class	Present % Acres	Future % Acres	Livestock Forage Production on Public Lands	Vegetation (Major Vegetative Sub-Type in Allot.)	Livestock Forage Condition Class	Present % Acres	Future % Acres
Coates Creek 161	Improve deer habitat by limiting use on browse to 50%.	Stable - Slight - Moderate- Critical- Severe -	0% 0% 80% 20% 0%	0% 0% 100% 0% 0%	Increase AUMs from 1 to 22.	Increase Sand dropseed from 5% to 8%, Indian ricegrass & Western wheatgrass from 1% to 4%, Galleta grass from 1% to 5%.	Good Fair Poor	0 0 100	0 50 50
King West Toms Canyon 163 Fish Canyon 164 Hill Creek Flats 166 Beezer 165	Improve deer habitat by improving Sagebrush vigor and density. Reduce winter competition with livestock.	Stable - Slight - Moderate- Critical- Severe -	0% 70% 29% 1% 0%	0% 82% 18% 0% 0%	Increase AUMs from 849 to 1606.	Increase Crested wheatgrass from 10% to 15%, desirable grass from 10% to 15-20%.	Good Fair Poor	13 37 50	23 46 31
Davis 201	Maintain critical deer winter range.	Stable - Slight - Moderate- Critical- Severe -	0% 67% 33% 0% 0%	0% 67% 33% 0% 0%	Increase AUMs from 427 to 655.	Increase plant cover & desirable species.	Good Fair Poor	0 34 66	17 50 33
Kannah Creek Common 202	Maintain deer winter range.	Stable - Slight - Moderate- Critical- Severe -	0% 63% 24% 13% 0%	0% 92% 8% 0% 0%	Increase AUMs from 3693 to 4101.	Increase Indian ricegrass from 1% to 50%.	Good Fair Poor	0 80 20	40 50 10
Whitewater Common 203	Improve deer winter range.	Stable - Slight - Moderate- Critical- Severe -	0% 85% 12% 0% 3%	0% 85% 12% 0% 3%	Increase spring forage for livestock. Increase AUMs from 2005 to 2422.	Improve browse condition & density.	Good Fair Poor	0 77 23	39 50 11
Gibbler Common 301	Maintain deer habitat by keeping utilization of Sagebrush at 30% and Mtn. mahogany at 60%.	Stable - Slight - Moderate- Critical- Severe -	0% 8% 50% 42% 0%	0% 33% 50% 17% 0%	Increase AUMs from 3315 to 4937.	Increase density from 36% to 40% for grass species. Maintain 50% utilization of key species.	Good Fair Poor	0 31 69	16 50 34
Wagon Park Common 302	Maintain deer habitat by keeping utilization of sagebrush at 30% and Mtn. mahogany at 60%.	Stable - Slight - Moderate- Critical- Severe -	0% 0% 57% 43% 0%	0% 0% 100% 0% 0%	Increase AUMs from 1164 to 1397.	Increase density by 10%. Maintain 50% utilization of key species.	Good Fair Poor	21 1 78	28 40 32

TABLE A1-1 (Continued)

SPECIFIC OBJECTIVES OF THE PROPOSED ALLOTMENT MANAGEMENT PLANS(INTENSIVE)

By Year 2000

Allotment Name and Number		Wildlife Habitat (Major Species)	Erosion Condition Class Present % Acres	Erosion Condition Class Future % Acres	Livestock Forage Production on Public Lands	Vegetation (Major Vegetative Sub-Type in Allot.)	Livestock Forage Condition Class	Present % Acres	Future % Acres
		increasing Serviceberry from 1% to 4%, Bitterbrush from 2% to 5%.	Slight - 0% Moderate-100% Critical- 0% Severe - 0%	45% 55% 0% 0%	75 to 150.	from 8% to 12%, Western wheatgrass from 2% to 5%, Fendler bluegrass from 8% to 12%.	Fair Poor	99 1	49 0
Palisade Flats	401	Decrease competition with deer by increasing livestock forage.	Stable - 0% Slight - 4% Moderate- 29% Critical- 67% Severe - 0%	0% 4% 29% 67% 0%	Increase AUMs from 108 to 400.	Increase Indian ricegrass, Galleta grass. Reduce Cheatgrass.	Good Fair Poor	0 73 27	36 50 14
Bulldraw Common	402	Improve deer habitat by utilizing 50% of browse.	Stable - 0% Slight - 1% Moderate- 2% Critical- 97% Severe - 0%	0% 1% 2% 97% 0%	Increase AUMs from 28 to 182.	Increase key species from 3% to 15%, keep utilization at 50%.	Good Fair Poor	0 95 5	47 50 3
Wright Draw	405	Maintain wildlife habitat.	Stable - 0% Slight - 0% Moderate- 90% Critical- 10% Severe - 0%	0% 20% 70% 10% 0%	Increase AUMs from 138 to 215.	Increase grass species from 11% to 20%.	Good Fair Poor	0 82 18	41 50 9
Blue Mesa	406	Maintain deer habitat by limiting use on Sagebrush to 50%. Protect riparian vegetation.	Stable - 0% Slight - 25% Moderate- 40% Critical- 35% Severe - 0%	10% 30% 42% 18% 0%	Increase AUMs from 1138 to 2408.	Increase Indian ricegrass from 1% to 10%, Galleta grass from 2% to 8%, Bluegrass from 2% to 5%.	Good Fair Poor	0 0 100	0 50 50
Bull Hill-Maverick Common	407	Improve deer habitat by limiting use on Mtn. mahogany to 50%.	Stable - 0% Slight - 10% Moderate- 33% Critical- 57% Severe - 0%	0% 21% 45% 34% 0%	Increase AUMs from 408 to 561.	Increase key species from 5% to 15%.	Good Fair Poor	0 88 12	44 50 6
Sinbad Valley Common Ames	409 413	Improve deer habitat by limiting use on Sagebrush to 50%.	Stable - 0% Slight - 0% Moderate- 22% Critical- 78% Severe - 0%	0% 11% 42% 47% 0%	Increase AUMs from 178 to 765.	Increase key species from 5% to 15%, stop invasion of Cactus & Rabbitbrush.	Good Fair Poor	0 23 77	11 50 39
Ute Creek Common	410	Improve deer habitat by limiting use on Mtn. mahogany & Serviceberry to 50%.	Stable - 0% Slight - 0% Moderate- 0% Critical-100% Severe - 0%	0% 0% 100% 0% 0%	Increase AUMs from 102 to 260.	Increase ground cover and plant density.	Good Fair Poor	0 3 97	1 50 49
Hamilton	433	Maintain wildlife habitat.	Stable - 0% Slight - 5% Moderate- 24%	0% 5% 24%	Increase AUMs from 14 to 49.	Increase density of key species. Stop invasion of Cactus	Good Fair Poor	0 1 99	1 99 0

TABLE A1-1 (Continued)

SPECIFIC OBJECTIVES OF THE PROPOSED ALLOTMENT MANAGEMENT PLANS(INTENSIVE)

By Year 2000

Allotment Name and Number	Wildlife Habitat (Major Species)	Erosion Condition Class Present % Acres	Erosion Condition Class Future % Acres	Livestock Forage Production on Public Lands	Vegetation (Major Vegetative Sub-Type in Allot.)	Livestock Forage Condition Class	Present % Acres	Future % Acres
		Critical- 71% Severe - 0%	71% 0%		& Rabbitbrush.			
North Creek 415	Maintain wildlife habitat.	Stable - 0% Slight - 0% Moderate- 18% Critical -82% Severe - 0%	0% 0% 25% 75% 0%	Increase AUMs from 17 to 55.	Increase grass cover to 25%.	Good Fair Poor	0 70 30	35 50 15
Hubbard Hubbard South 419 Beaver Mesa 839 Dakota Rock 840	Maintain deer habitat by limiting use on: Sagebrush to 40%, Blackbrush to 60%, Mtn. mahogany to 50%.	Stable - 0% Slight - 4% Moderate- 55% Critical- 41% Severe - 0%	0% 36% 64% 0% 0%	Increase AUMs from 831 to 1040.	Increase Indian ricegrass from 3% to 10%, Galleta grass from 9% to 15%, Western wheatgrass from 1% to 5%, Kentucky bluegrass from 3% to 8%, and Sedge from 3% to 8%. Maintain 40% canopy and 60% ground cover on riparian vegetation along Dolores River.	Good Fair Poor	0 10 90	5 50 45
GML 420	Improve wildlife habitat by protecting riparian habitat. Withdraw 885 acres for wildlife use.	Stable - 0% Slight - 0% Moderate-100% Critical- 0% Severe - 0%	0% 33% 67% 0% 0%	Increase AUMs from 74 to 86.	Increase Galleta grass from 17% to 20%. Reduce amount of cactus.	Good Fair Poor	0 0 100	0 50 50
Bergis North Mesa 424	Maintain deer habitat by limiting use on browse to 50%.	Stable - 0% Slight - 100% Moderate- 0% Critical- 0% Severe - 0%	100% 0% 0% 0% 0%	Increase AUMs from 143 to 160.	Increase Junegrass by 10%, Threadleaf sedge by 5%, Western wheatgrass by 3%.	Good Fair Poor	100 0 0	100 0 0
Dolores Pt. 429	Maintain deer habitat by limiting use on Sagebrush to 40% and 60% on Blackbrush.	Stable - 0% Slight - 0% Moderate- 64% Critical- 36% Severe - 0%	0% 32% 52% 16% 0%	Increase AUMs from 534 to 999.	Increase Indian ricegrass from 1% to 5%, Galleta grass from 12% to 15%, Western wheatgrass from 6% to 10%. Maintain 50% utilization.	Good Fair Poor	0 10 90	5 49 46
Dolores River 411 Bull Canyon, 414 Casto-Lines 408	Maintain wildlife habitat.	Stable - 0% Slight - 0% Moderate- 0% Critical- 41% Severe - 59%	0% 0% 0% 41% 59%	Increase AUMs from 31 to 356.	Increase plant cover & reduce hedging of browse.	Good Fair Poor	0 9 91	25 75 0

TABLE A1-1 (Continued)

SPECIFIC OBJECTIVES OF THE PROPOSED ALLOTMENT MANAGEMENT PLANS(INTENSIVE)

By Year 2000

Allotment Name and Number	Wildlife Habitat (Major Species)	Erosion Condition Class		Livestock Forage Production on Public Lands	Vegetation (Major Vegetative Sub-Type in Allot.)	Livestock Forage Condition Class		
		Present % Acres	Future % Acres				Present % Acres	Future % Acres
	range. Increase deer winter range by increasing browse.	Slight - 28% Moderate- 71% Critical- 1% Severe - 0%	28% 71% 1% 0%	1299 to 2621.	species.	Fair Poor	93 7	50 35
Coal Gulch-Roan Creek 502	Increase spring & summer forage for deer.	Stable - 6% Slight - 27% Moderate- 35% Critical- 32% Severe - 0%	6% 30% 32% 32% 0%	Increase AUMs from 846 to 1876.	Increase key species from 8% to 15%.	Good Fair Poor	5 93 2	47 48 5
Garr Mesa Garr Mesa 503 Post Cyn 510 Corral Cyn Mtn. 606x Sphnix-Mitchell 607x Dry Cyn-Demaree 608x	Improve big game habitat by limiting use on Serviceberry to 50%.	Stable - 0% Slight - 32% Moderate- 67% Critical- 1% Severe - 0%	0% 54% 45% 1% 0%	Increase AUMs from 1312 to 2645.	Increase Galleta grass from 2% to 10%, Indian ricegrass from 1% to 5%, Wildrye from 11% to 15%, Western wheatgrass from 2% to 15%.	Good Fair Poor	0 43 57	22 50 28
Hunter Wash 504	Increase antelope habitat by increasing Winterfat from 1% to 3%.	Stable - 0% Slight - 15% Moderate- 85% Critical- 0% Severe - 0%	0% 100% 0% 0% 0%	Increase AUMs from 760 to 1411.	Increase Galleta grass from 5% to 15%, Indian ricegrass from 2% to 6%.	Good Fair Poor	6 94 0	53 47 0
Buniger 505	Maintain deer habitat by limiting use on browse to 50%.	Stable - 0% Slight - 0% Moderate- 90% Critical- 10% Severe - 0%	0% 0% 90% 10% 0%	Increase AUMs from 60 to 70.	Increase Indian ricegrass from 3% to 10%, Western wheatgrass from 1% to 10%, Galleta grass from 10% to 13%.	Good Fair Poor	0 92 8	46 50 4
Lapham Canyon Comm. 506	Improve big game habitat by limiting use on browse to 50%.	Stable - 0% Slight - 100% Moderate- 0% Critical- 0% Severe - 0%	0% 100% 0% 0% 0%	Increase AUMs from 93 to 435.	Increase Indian ricegrass from 5% to 10%, Columbia needlegrass from 1% to 10%, Bluegrass from 5% to 10%.	Good Fair Poor	0 87 13	44 50 6
Little Salt 507	Maintain antelope habitat by keeping present browse composition.	Stable - 0% Slight - 18% Moderate- 82% Critical- 0% Severe - 0%	0% 32% 68% 0% 0%	Maintain 2199 AUMs.	Maintain key species.	Good Fair Poor	0 0 100	0 50 50
Mogensen 508	Increase prey populations for eagles and falcons by having 30% grass and 10%	Stable - 0% Slight - 18% Moderate- 82% Critical- 0%	0% 100% 0% 0%	Maintain 67 AUMs.	Increase Galleta grass from 4% to 10%.	Good Fair Poor	0 0 100	0 100 0

TABLE A1-1 (Continued)

SPECIFIC OBJECTIVES OF THE PROPOSED ALLOTMENT MANAGEMENT PLANS(INTENSIVE)

By Year 2000

Allotment Name and Number	Wildlife Habitat (Major Species)	Erosion Condition Class Present % Acres	Erosion Condition Class Future % Acres	Livestock Forage Production on Public Lands	Vegetation (Major Vegetative Sub-Type in Allot.)	Livestock Forage Condition Class	Livestock Forage Condition Class Present % Acres	Livestock Forage Condition Class Future % Acres
	forbs.	Severe - 0%	0%					
Mt. Garfield Comm. 509	Increase antelope habitat by increasing Nuttall's saltbush.	Stable - 0% Slight - 9% Moderate- 73% Critical- 2% Severe - 16%	0% 9% 73% 2% 16%	Increase AUMs from 1900 to 5248.	Increase key species.	Good Fair Poor	0 2 98	1 50 49
Badger Wash 601	Improve wildlife habitat by limiting utilization of browse to 50%.	Stable - 0% Slight - 15% Moderate- 0% Critical- 85% Severe - 0%	0% 15% 85% 0% 0%	Increase AUMs from 276 to 840.	Increase Galleta & Indian ricegrass from 5% to 25%. Decrease present utilization.	Good Fair Poor	0 40 60	40 60 0
East Salt 602	Increase wildlife habitat.	Stable - 0% Slight - 34% Moderate- 62% Critical- 3% Severe - 1%	0% 55% 42% 2% 1%	Increase AUMs from 9928 to 15,692.	Increase Indian ricegrass by 100%.	Good Fair Poor	82 3 15	84 9 7
West Salt Comm. 603	Increase wildlife habitat by limiting use on Sagebrush to 40% and Serviceberry to 50%. Maintain Shadscale on desert.	Stable - 8% Slight - 26% Moderate- 35% Critical- 31% Severe - 0%	8% 26% 66% 0% 0%	Increase AUMs from 2001 to 8187.	Increase key species, Sand dropseed, Galleta grass, Indian ricegrass.	Good Fair Poor	6 86 8	49 47 4
Crow Bottom 604	Protect riparian vegetation along Colorado River.	Stable - 0% Slight - 0% Moderate-100% Critical- 0% Severe - 0%	0% 100% 0% 0% 0%	Increase AUMs from 244 to 440.	Increase Galleta grass from 9% to 15%, Indian ricegrass from 5% to 10%.	Good Fair Poor	0 88 12	44 50 6
Maluy 610	Increase wildlife habitat by increasing browse cover to 5%.	Stable - 0% Slight - 73% Moderate- 27% Critical- 0% Severe - 0%	0% 83% 17% 0% 0%	Maintain 168 AUMs.	Increase key species to an average of 15%.	Good Fair Poor	43 57 0	71 29 0
Baker-Bitter Creek 612	Increase wildlife habitat to limiting use on browse to 50%.	Stable - 7% Slight - 18% Moderate- 75% Critical- 0% Severe - 0%	7% 64% 29% 0% 0%	Increase AUMs from 1026 to 1056.	Maintain grass cover at 30%. Maintain litter cover at 40%. Increase key species from 7% to 15%.	Good Fair Poor	65 15 20	72 18 10
Rabbit Valley 613	Increase wildlife habitat by increasing ground cover. Exclude grazing from 6 & 50 reservoir to protect waterfowl habitat.	Stable - 0% Slight - 0% Moderate-100% Critical- 0% Severe - 0%	0% 38% 62% 0% 0%	Increase AUMs from 204 to 1504.	Increase Indian ricegrass from 6% to 13%, Sand dropseed from 1% to 5%, Galleta grass from 19% to 25%, litter	Good Fair Poor	0 68 32	34 50 16

TABLE A1-1 (Continued)

SPECIFIC OBJECTIVES OF THE PROPOSED ALLOTMENT MANAGEMENT PLANS (INTENSIVE)

By Year 2000

Allotment Name and Number	Wildlife Habitat (Major Species)	Erosion Condition Class Present % Acres	Erosion Condition Class Future % Acres	Livestock Forage Production on Public Lands	Vegetation (Major Vegetative Sub-Type in Allot.)	Livestock Forage Condition Class	Present % Acres	Future % Acres
					35%.			
Prairie Cyn. Johns Canyon 616	Maintain wildlife habitat by maintaining 15% Bitterbrush and use at 40%.	Stable - 0% Slight - 56% Moderate- 44% Critical- 0% Severe - 0%	0% 59% 41% 0% 0%	Increase AUMs from 616 to 668.	Increase key species from 1% to 15%.	Good Fair Poor	70 25 5	83 15 2
Berry Homestead 702	Increase wildlife habitat by increasing Sagebrush from 1% to 4% and limiting use to 40%.	Stable - 0% Slight - 0% Moderate- 0% Critical-100% Severe - 0%	0% 0% 100% 0% 0%	Maintain 215 AUMs.	Increase Galleta grass from 8% to 12%, Indian ricegrass from 1% to 7%, Shadscale from 7% to 10%.	Good Fair Poor	0 0 100	50 50 0
Spears Brink Pedigo Gulch 703 East End Cow Mtn. 716 Horse Mtn. 726 Middle Cow Ridge 741 Stoner 746 Walker 749 West Cow Mtn. 751 West Spears 753	Increase wildlife habitat by maintaining use on Sagebrush at 40%.	Stable - 17% Slight - 0% Moderate- 83% Critical- 0% Severe - 0%	17% 36% 47% 0% 0%	Increase AUMs from 1285 to 1674.	Increase Galleta grass from 6% to 15%, perennial grasses from 1% to 15%. Maintain Columbia needlegrass at 22%.	Good Fair Poor	16 56 28	41 42 17
Corcoran Wash 704	Maintain wildlife habitat.	Stable - 19% Slight - 39% Moderate- 42% Critical- 0% Severe - 0%	19% 39% 42% 0% 0%	Maintain 1296 AUMs.	Increase grasses and forbs to 65%.	Good Fair Poor	0 84 16	42 50 8
Brush Mtn. 705	Maintain wildlife habitat by limiting use on browse to 50%. Maintain 40% Sagebrush for Sagegrouse.	Stable - 63% Slight - 37% Moderate- 0% Critical- 0% Severe - 0%	63% 37% 0% 0% 0%	Increase AUMs from 852 to 869.	Maintain utilization of key species at 50%. Maintain current key species composition.	Good Fair Poor	92 8 0	100 0 0
Burdick E. of Ranch/ Tater Hills Burdick E. of Ranch 707 Tater Hills 747	Maintain deer habitat by limiting use on browse at 50%.	Stable - 0% Slight - 0% Moderate- 27% Critical- 73% Severe - 0%	0% 0% 55% 45% 0%	Maintain 267 AUMs.	Increase Indian ricegrass from 9% to 15%, Western wheatgrass from 2% to 10%, Fendler bluegrass from 13% to 15%.	Good Fair Poor	2 82 16	43 49 8

TABLE A1-1 (Continued)

SPECIFIC OBJECTIVES OF THE PROPOSED ALLOTMENT MANAGEMENT PLANS(INTENSIVE)

By Year 2000

Allotment Name and Number	Wildlife Habitat (Major Species)	Erosion Condition Class Present % Acres	Erosion Condition Class Future % Acres	Livestock Forage Production on Public Lands	Vegetation (Major Vegetative Sub-Type in Allot.)	Livestock Forage Condition Class	Present % Acres	Future % Acres
Rodeo Grounds Conn Crk. 710 East Spears Common 718 Ind. Allot. E. of Ranch 737 Logan Wash Common 734 McCurdy Wash 735 West Logan Wash 752	Improve deer habitat by limiting use on Sagebrush and Mtn. mahogany to 40%.	Stable - 0% Slight - 0% Moderate- 12% Critical- 80% Severe - 8%	0% 0% 42% 50% 8%	Increase AUMs from 993 to 1176.	Increase key species.	Good Fair Poor	2 5 93	6 49 45
Coon Hollow Common 712	Improve deer habitat by limiting use on Mtn. mahogany & Serviceberry to 50%.	Stable - 0% Slight - 0% Moderate- 14% Critical- 43% Severe - 43%	0% 0% 28% 43% 29%	Increase AUMs from 525 to 1657.	Increase Galleta grass from 15% to 20%, Indian ricegrass from 1% to 10%.	Good Fair Poor	0 44 56	22 50 28
Winter Flats/ Deer Park 713	Improve wildlife habitat by increasing vegetal cover.	Stable - 0% Slight - 8% Moderate- 36% Critical- 27% Severe - 29%	0% 26% 31% 28% 15%	Maintain 2505 AUMs.	Increase vegetal density from 20% to 30%. Double the density of all key species.	Good Fair Poor	0 71 29	35 50 15
Doughtery Gulch 714	Improve wildlife habitat.	Stable - 0% Slight - 61% Moderate- 39% Critical- 0% Severe - 0%	0% 100% 0% 0% 0%	Maintain 140 AUMs.	Increase Kentucky bluegrass from 31% to 40%. Increase litter from 9% to 15%.	Good Fair Poor	0 100 0	50 50 0
Dry Fork 715	Improve wildlife habitat by reducing amount of Sagebrush.	Stable - 17% Slight - 18% Moderate- 39% Critical- 26% Severe - 0%	17% 18% 39% 26% 0%	Maintain 564 AUMs.	Increase: Galleta grass from 5% to 15%, Western wheatgrass from 4% to 6%.	Good Fair Poor	14 52 34	40 43 17
Head of Carr Creek 721	Improve wildlife habitat.	Stable - 0% Slight - 45% Moderate- 49% Critical- 3% Severe - 3%	0% 68% 26% 3% 3%	Increase AUMs from 231 to 250.	Increase Kentucky bluegrass from 26% to 35%.	Good Fair Poor	0 74 26	68 32 0
Henderson/4A Ridge Henderson Ridge Comm. 723	Maintain big game habitat by limiting use on Sagebrush & Serviceberry to 50%.	Stable - 84% Slight - 16% Moderate- 0% Critical- 0% Severe - 0%	100% 0% 0% 0% 0%	Increase AUMs from 1252 to 1283.	Maintain key species in present condition.	Good Fair Poor	20 61 19	51 40 9

TABLE A1-1 (Continued)

TABLE A1-1 (Continued)

SPECIFIC OBJECTIVES OF THE PROPOSED ALLOTMENT MANAGEMENT PLANS(INTENSIVE)

By Year 2000

Allotment Name and Number		Wildlife Habitat (Major Species)	Erosion Condition Class			Livestock Forage Production on Public Lands	Vegetation (Major Vegetative Sub-Type in Allot.)	Livestock Forage Condition Class		
				Present % Acres	Future % Acres				Present % Acres	Future % Acres
Lower 4A Ridge	738									
Kimball Creek & Mtn. Carbon Kimball Creek Kimball Mtn.	 722 724 729	Maintain wildlife habitat.	Stable - Slight - Moderate- Critical- Severe -	21% 22% 42% 15% 0%	21% 22% 57% 0% 0%	Maintain 807 AUMs.	Maintain key species at present level.	Good Fair Poor	19 48 33	42 41 17
Logan End Common	732	Maintain wildlife habitat.	Stable - Slight - Moderate- Critical- Severe -	36% 64% 0% 0% 0%	36% 64% 0% 0% 0%	Increase AUMs from 323 to 365.	Increase Nodding brome from 1% to 6%, Columbia needlegrass from 3% to 8%.	Good Fair Poor	81 19 0	92 8 0
Logan Gulch	733	Maintain deer habitat by limiting use on browse to 50%.	Stable - Slight - Moderate- Critical- Severe -	0% 0% 69% 31% 0%	0% 69% 31% 0% 0%	Increase AUMs from 479 to 508.	Increase Galleta grass, Indian ricegrass, Wildrye from 5% to 10%.	Good Fair Poor	0 100 0	50 50 0
Lower Roan Creek Common	737	Maintain deer habitat by limiting use on Mtn. mahogany & Serviceberry to 50%.	Stable - Slight - Moderate- Critical- Severe -	0% 0% 68% 32% 0%	0% 68% 0% 32% 0%	Increase AUMs from 177 to 206.	Increase Indian ricegrass & Western wheatgrass from 1% to 5%.	Good Fair Poor	0 0 100	0 50 50
Paddock	742	Increase deer habitat by limiting use on Mtn. mahogany to 40%.	Stable - Slight - Moderate- Critical- Severe -	0% 0% 0% 100% 0%	0% 0% 100% 32% 0%	Increase: AUMs from 115 to 245.	Increase Indian ricegrass from 1% to 5%, Western wheatgrass from 5% to 10%.	Good Fair Poor	22 76 2	60 39 1
Roan Creek Common	744	Maintain wildlife habitat.	Stable - Slight - Moderate- Critical- Severe -	100% 0% 0% 0% 0%	100% 0% 0% 0% 0%	Maintain 448 AUMs.	Increase key species from 3% to 15%.	Good Fair Poor	16 77 7	54 42 4
Round Mtn.	745	Improve wildlife habitat by limiting use on browse to 50%.	Stable - Slight - Moderate- Critical- Severe -	0% 18% 58% 24% 0%	9% 38% 41% 12% 0%	Maintain 1148 AUMs.	Increase key species from 5% to 20%.	Good Fair Poor	0 85 15	42 50 8
Upper Brush Mtn.	748	Maintain wildlife habitat by maintaining Sagebrush at 20%.	Stable - Slight - Moderate- Critical- Severe -	0% 0% 100% 0% 0%	0% 31% 69% 0% 0%	Increase AUMs from 306 to 356.	Increase Bluegrass from 6% to 10%, Columbia needlegrass 13% to 18%.	Good Fair Poor	0 100 0	50 50 0

TABLE A1-1 (Continued)

SPECIFIC OBJECTIVES OF THE PROPOSED ALLOTMENT MANAGEMENT PLANS(INTENSIVE)

By Year 2000

Allotment Name and Number	Wildlife Habitat (Major Species)	Erosion Condition Class Present % Acres	Erosion Condition Class Future % Acres	Livestock Forage Production on Public Lands	Vegetation (Major Vegetative Sub-Type in Allot.)	Livestock Forage Condition Class	Present % Acres	Future % Acres
Whittaker Flats 754	Improve wildlife habitat by limiting use on Sagebrush to 50%.	Stable - 0% Slight - 100% Moderate- 0% Critical- 0% Severe - 0%	0% 100% 0% 0% 0%	Increase AUMs from 238 to 292.	Maintain key species at 30%.	Good Fair Poor	85 15 0	100 0 0
4A Individual 755	Improve deer habitat by limiting use on Sagebrush to 50%.	Stable - 0% Slight - 0% Moderate- 37% Critical- 63% Severe - 0%	0% 0% 100% 0% 0%	Increase AUMs from 9 to 34.	Increase Western wheatgrass and Bluegrass from 5% to 20%.	Good Fair Poor	0 100 0	50 50 0
Sunnyside Common 801	Improve wildlife habitat by limiting use on Sagebrush to 40%.	Stable - 0% Slight - 31% Moderate- 69% Critical- 0% Severe - 0%	0% 31% 69% 0% 0%	Increase AUMs from 1077 to 1656.	Increase Galleta grass from 7% to 12%.	Good Fair Poor	0 33 67	17 50 33
Spring Creek to Coon Creek 807	Improve deer habitat by limiting use on Sagebrush to 40%.	Stable - 0% Slight - 64% Moderate- 36% Critical- 0% Severe - 0%	0% 64% 36% 0% 0%	Increase AUMs from 373 to 513.	Increase key species.	Good Fair Poor	0 65 35	26 50 24
White Mtn. Common 808	Improve deer habitat by limiting use on Sagebrush to 40% & 50% on Mtn. mahogany & Serviceberry.	Stable - 0% Slight - 0% Moderate-100% Critical- 0% Severe - 0%	0% 56% 44% 0% 0%	Increase AUMs from 401 to 430.	Limit use on key species to 50%.	Good Fair Poor	0 100 0	50 50 0
Wild Country Common 809	Improve deer habitat by limiting use on Sagebrush to 50%.	Stable - 0% Slight - 0% Moderate-100% Critical- 0% Severe - 0%	0% 35% 65% 0% 0%	Increase AUMs from 718 to 740.	Increase Galleta grass from 5% to 10%, Indian ricegrass from 1% to 5%.	Good Fair Poor	0 100 0	50 50 0
Lyons-Anderson Lyons 811 Anderson 812	Increase wildlife habitat by limiting use on Sagebrush to 40%.	Stable - 0% Slight - 0% Moderate- 63% Critical- 37% Severe - 0%	0% 0% 100% 0% 0%	Increase AUMs from 283 to 424.	Increase Indian ricegrass from 2% to 10%, Western wheatgrass from 1% to 5%, Galleta grass from 8% to 10%.	Good Fair Poor	0 0 100	0 100 0
Big Park 843	Maintain deer habitat by limiting use on Sagebrush and Serviceberry to 50%.	Stable - 0% Slight - 0% Moderate-100% Critical- 0% Severe - 0%	0% 47% 53% 0% 0%	Maintain 759 AUMs.	Incrase Galleta grass & Indian ricegrass from 1% to 10%.	Good Fair Poor	0 0 100	0 50 50
Lower Rapid -	Improve wildlife	Stable - 18%	27%	Increase AUMs from	Increase key species	Good	19	60

TABLE A1-1 (Continued)

SPECIFIC OBJECTIVES OF THE PROPOSED ALLOTMENT MANAGEMENT PLANS(INTENSIVE)

By Year 2000

Allotment Name and Number	Wildlife Habitat (Major Species)	Erosion Condition Class	Present % Acres	Future % Acres	Livestock Forage Production on Public Lands	Vegetation (Major Vegetative Sub-Type in Allot.)	Livestock Forage Condition Class	Present % Acres	Future % Acres
Cottonwood Lower Rapid 835 Cottonwood 844	habitat by limiting use on Sagebrush to 50%.	Slight -	9%	18%	129 to 278.	from 6% to 10%.	Fair	81	40
		Moderate-	55%	37%			Poor	0	0
		Critical-	18%	18%					
		Severe -	0%	0%					
Jerry Gulch 847	Maintain wildlife habitat. Maintain 25% Sagebrush for Sagegrouse.	Stable -	0%	0%	Increase AUMs from 158 to 194.	Increase key species.	Good	18	26
		Slight -	11%	11%			Fair	16	41
		Moderate-	0%	0%			Poor	66	33
		Critical-	89%	89%					
		Severe -	0%	0%					

APPENDIX 2

Appendix 2

DESIGN DETAILS OF RANGE FACILITIES

Reservoirs

Reservoirs would be designed and built to provide water for livestock and wildlife. They would vary widely in size and design; a typical reservoir would cover about one-quarter acre. Reservoirs would normally be constructed with a bulldozer and a scraper. Figure A2-1 shows a typical reservoir.

Reservoirs would be fenced at a distance to provide for maximum riparian vegetation development; water for livestock would be piped out to troughs. Areas in which physical conditions would provide for development of riparian habitat, and which should therefore be fenced, would be determined by the District soil scientist. The introduction of desirable riparian plants, as determined by the District wildlife and fisheries specialists, would be undertaken as soon as practical following the completion of construction.

Catchments

Catchments, which are structures designed to collect rainwater and snow, would be designed in various ways depending on the number of livestock, anticipated wildlife, and average yearly precipitation. In choosing a site, such things as slope and soil type would be considered. Where a pipeline would be needed, the potential for gravity flow to the drinking troughs would also be taken into account. Figure A2-2 shows a typical catchment.

Catchments would supply water for troughs, wildlife watering devices, and storage tanks. These would be installed at predetermined points to meet projected needs.

Troughs would be designed for use by both livestock and large wildlife. Wildlife escape ladders or ramps would be installed on all troughs. A valve approximately 25 feet from each trough would control the water level.

Wildlife watering devices for birds and small wildlife would be installed at ground level. A small fiberglass or concrete bowl would provide the drinking basin. The basin would have a flat slope from the bottom to the lip so that the sides would be like a ramp; some would be tilted to allow a small seep, permitting limited green grass growth. The water level would be adjusted by a control unit in a protective box nearby. Natural barriers would be used to keep livestock away from the wildlife water basin where possible, with fencing installed as needed.

Twenty guzzlers, which are small catchments for game species, are being installed by the Colorado Division of Wildlife. These have a watershed apron usually much smaller than 20' X 20' and a storage capacity of 500 to 1000 gallons.

Storage tanks used with catchments would be made of fiberlass reinforced plastic (FRP), steel, concrete, or Butyl Rubber. They would hold 500 to 200,000 gallons each.

Spring Developments

Springs generally fall into two categories: point source and seep area. Both types would require excavation into the soil or sandstone where the seep or water flow appears at the surface. Figure A2-3 shows a typical spring development of a seep.

In some cases, a drilled hole into or below the seep would allow water to flow out of a pipe installed in the hole. The drilled hole, approximately 2 inches in diameter, would be located so that water trapped behind a fault or incline in rock would drain only through the pipe.

Generally, excavation by hand or backhoe would be required. A track-type tractor might be required to move large rocks or gain access for installing a water collection box and pipeline. A seep area would require the excavation of trenches 36 inches deep by 36 inches wide for the length of the seep area.

Clearing for spring development would be limited to the area where a spring box and collection pipe are installed. All excavations, open cuts, or fills would be shaped and blended with the surrounding area. Any grass sod removed would be replaced in the same location after construction is completed. All materials used would resist rust. Small mammal and bird ramps would be installed on tanks that do not provide access or escape in their design.

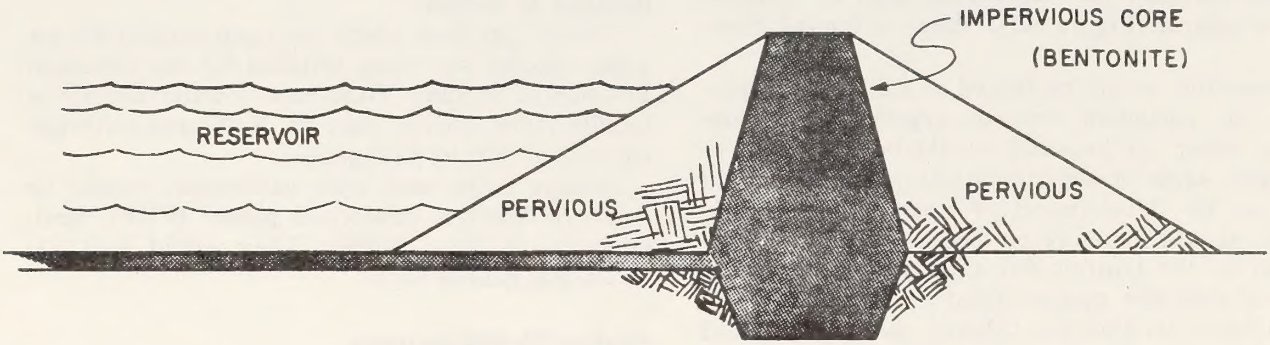


Figure A2-1. Earthen reservoir

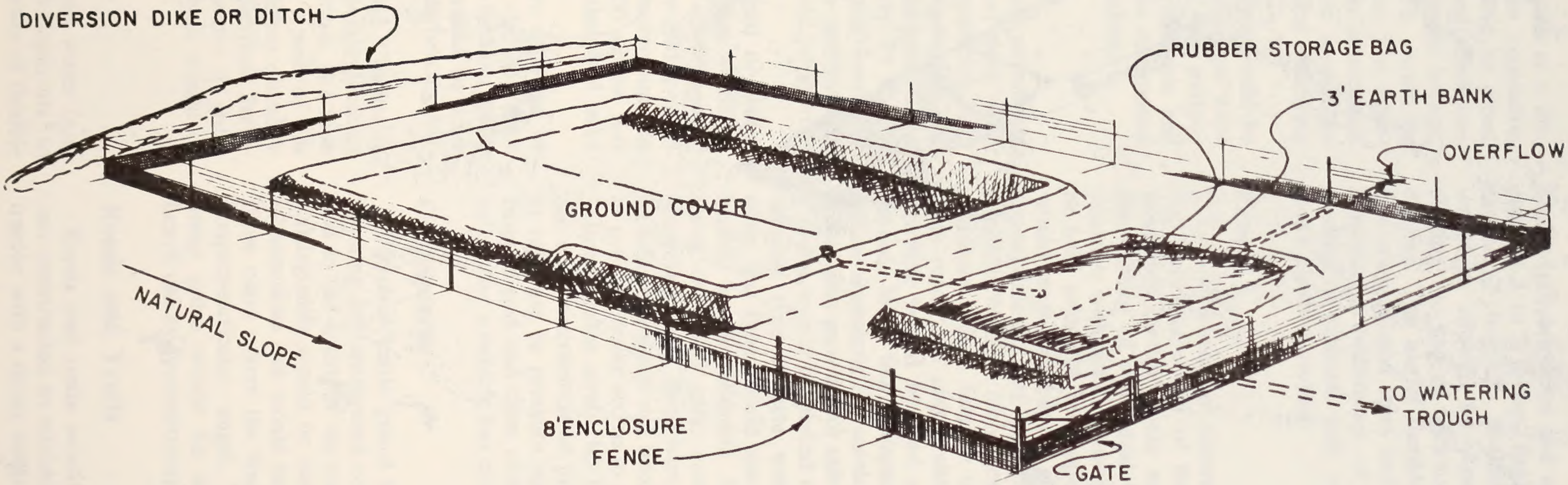


Figure A2-2. Typical rainwater harvesting catchment.

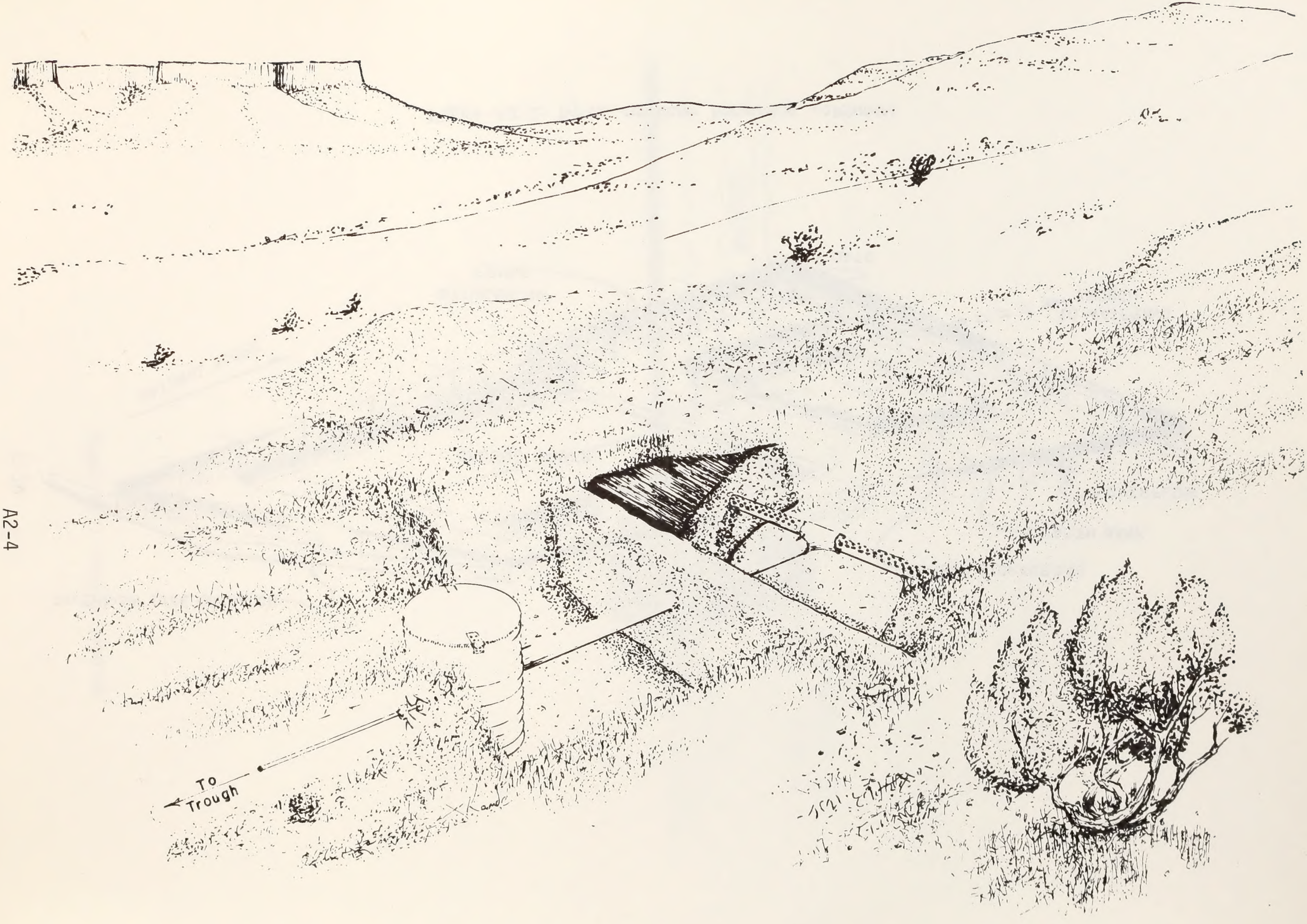


Figure A2-3. Seep area spring developement.

Spring developments would be fenced at a distance to provide for maximum riparian vegetation development; water for livestock would be piped out to troughs. Areas in which physical conditions would provide for development of riparian habitat, and which should therefore be fenced, would be determined by the District soil scientist. The introduction of desirable riparian plants, as determined by the District wildlife and fisheries specialists, would be undertaken as soon as practical following the completion of construction.

Watering devices supplied by springs would be allowed to overflow; if the overflow volume were sufficient to support riparian habitat, the wetland area created would be fenced. The location and size of the area to be fenced would be determined by the District soils and wildlife specialists.

Wells

Wells would supply a source of permanent water. Figure A2-4 shows a typical well with pumping equipment. Well site preparation and clearing would vary with terrain, vegetation, and drilling equipment. The disturbed area around the drilling point would be approximately 75 to 150 feet in diameter. The actual drill point would be located so as to prevent unnecessary soil disturbance, although some disturbance would be inevitable on extremely rough terrain.

A pit would be excavated for mud or water storage during the drilling. Drill cuttings would be placed in the pit, which would be covered over upon completion. The filled-in pit would have a compacted density equal to that of the surrounding earth. A typical pit would cover 200 square feet and would be within the larger disturbed area around the well.

Unless a flowing artesian well were expected or depth thickness and other aquifer characteristics were known, wells would be drilled without using mud pumped under pressure. This would be done to avert the possible plugging of waterbearing formations.

A typical well would involve a hole 9 inches in diameter and 600 feet deep, which would produce at least 9.8 cubic yards of drilled material. A 6-inch casing or pipe would be installed in a well of this size. The drill hole would be of sufficient diameter to receive whatever casing size is specified. Perforations in the casing would allow water to enter and then flow out the top. A windmill would be installed where feasible.

Pipelines

Pipelines would be used to transport water from wells, catchments, and spring developments to tanks and troughs. Pipes would be made of flexible plastic (polyethylene) and would have inside diameters of 1 to 2 inches. Burial depths would rarely exceed 2 feet. A 10-foot disturbance corridor would be allowed for pipe laying operations, including the use of backhoe or ripper for trench digging. The use of flexible pipe would allow for detouring around trees and other natural features, minimizing disturbance of the environment. Reseeding of exposed soils would be scheduled for every pipeline project.

Fences

Typical fences are shown in figure A2-5. Clearing for construction of fence lines would be by hand tool methods only and would be limited to the cutting of individual trees and brush which interfere with actual construction. All fences would be built using the least obtrusive fence design that would meet multiple-use resource management responsibilities. Long straight fencelines would be avoided. Wooden fence posts would be used to the maximum extent feasible in the foreground of all main roads and visitor sites. Trees situated in the fenceline would be used as posts rather than removed. With few exceptions, new fences would follow standards for antelope range fences, which would also provide for safe deer crossings.

Gates would be placed in fences as needed. The simplest type of gate would be made of barbed wire; this type would not be used on roads used heavily by recreationists. Another type, the hinged metal or wood gate, could be more easily and securely locked. Both wire and hinged gates would be left open when not needed for livestock control to provide easier access to public lands.

Bump gates could be installed, although these are quite uncommon at present. Bump gates open in response to pressure applied by a vehicle to a bumper pad and then close and relatch automatically after a vehicle has driven through.

Cattleguards

A typical cattle guard is shown in figure A2-5. Clearing for cattleguard construction would be limited to the width of the roadway through the gate. Cattleguards would be installed in a fence at road intersections and would be square with the road in those cases where the fence crosses the road at a nonperpendicular angel. Either cattleguards or bump gates would be used on roads receiving heavy use by recreationists.

Roads and Trails

Roads and trails would be surveyed, designed, and constructed to minimize erosion. A track-type tractor with a dozer blade would be used to shape

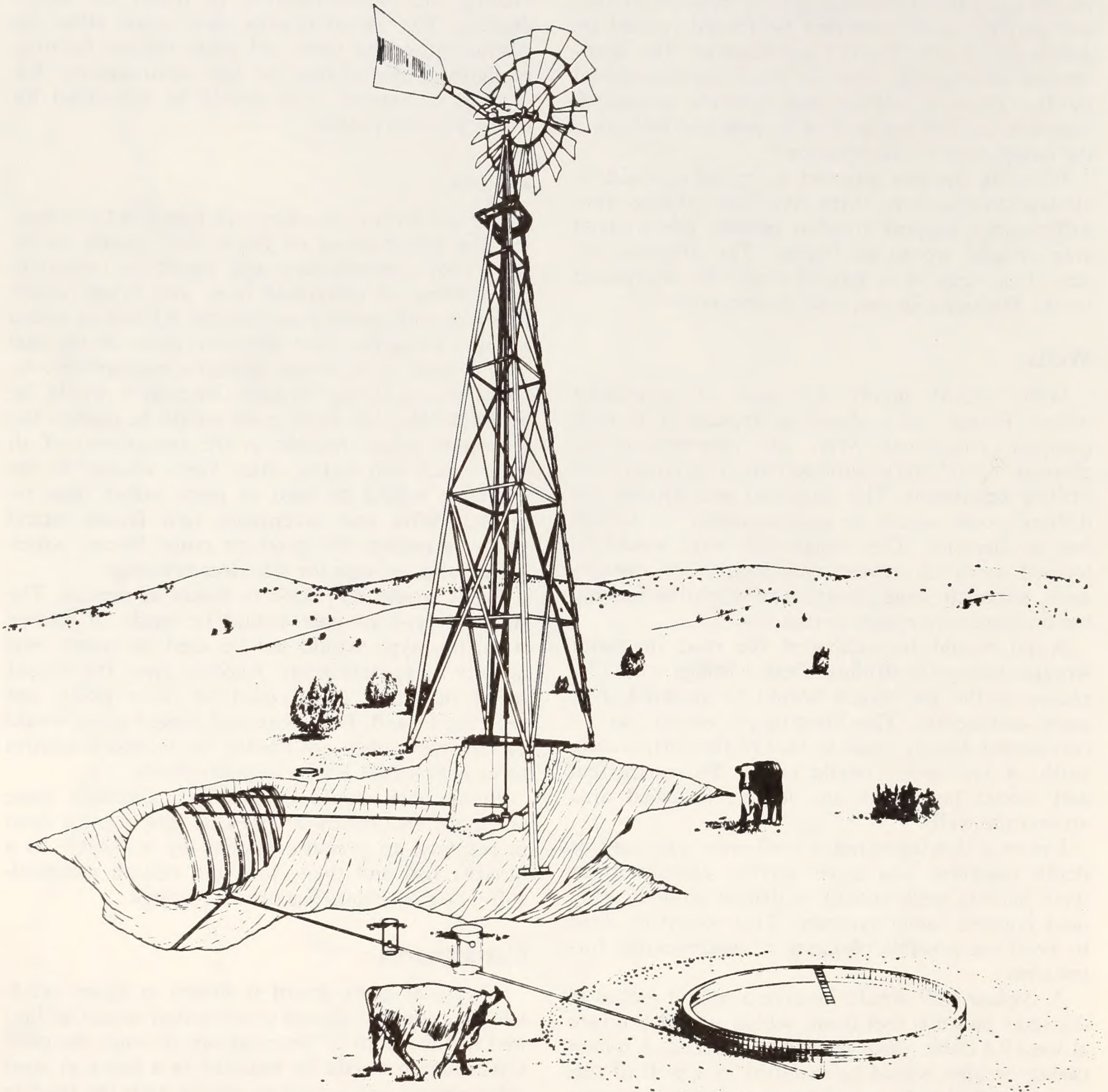


Figure A2-4. Typical well.

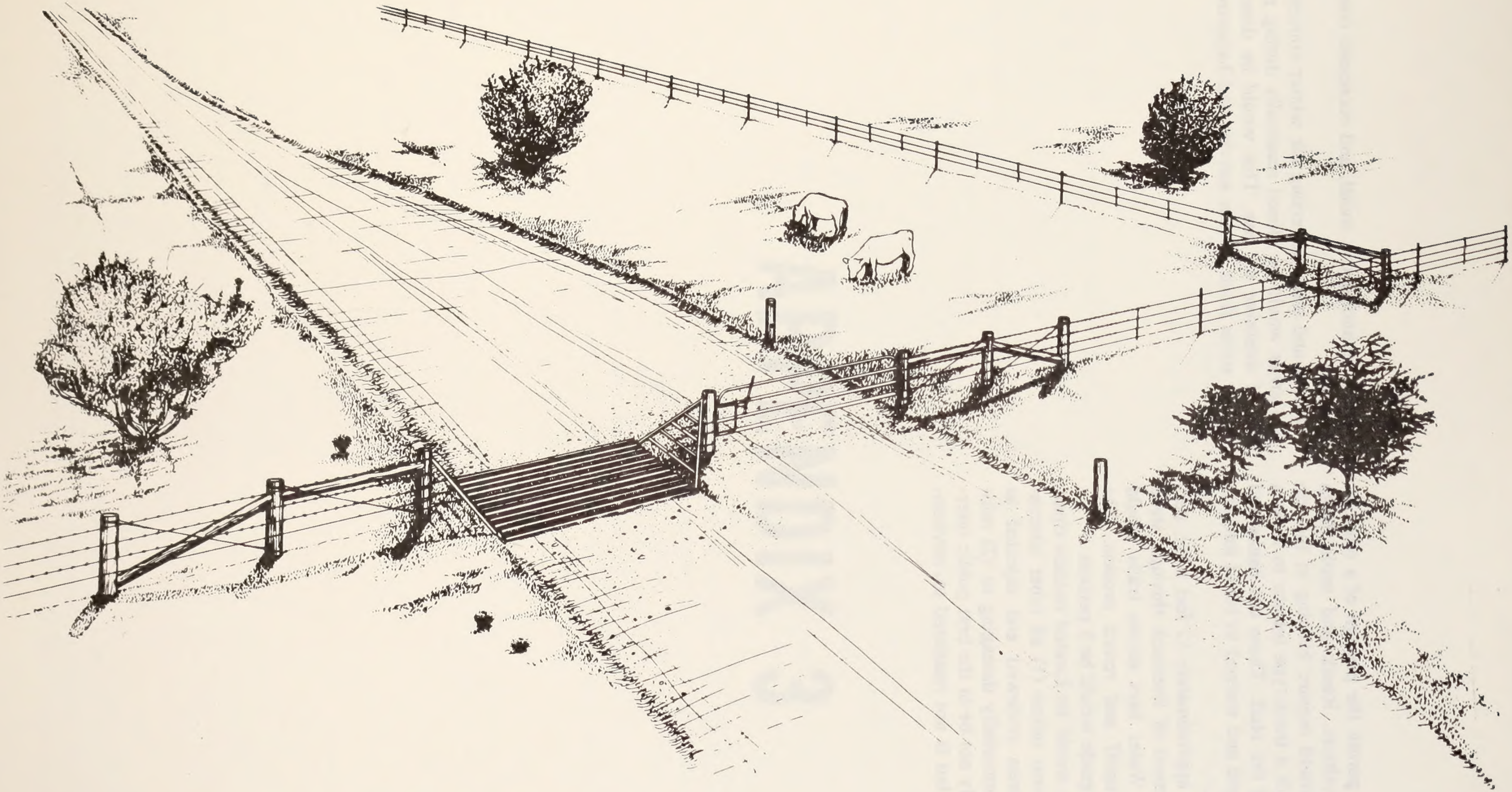


Figure A2-5. Typical fence: typical cattle guard.

a trail that would permit the passage of a truck or a 4-wheel drive vehicle. Roads and trails down sandstone bluffs would require blasting at the top and excavating with a track-type tractor to form a cut on the side of the bluff. These cut banks and fills would be shaped and warped to blend into the surrounding slopes.

Trails would be approximately 12 feet wide, permitting safe movement of livestock through steep or rocky terrain. Water bars across trails would divert downhill runoff and retard erosion. The maximum average grade would be 8 percent.

Roads and trails would be located outside riparian and wetland areas unless (1) all other alternative routes had been reviewed and rejected as being more environmentally damaging or (2) relocation would clearly not be in the best public interest. This includes, but is not restricted to, environmental, technological, social, and economic considerations.

Roads and trails traversing elk winter concentration areas would be closed seasonally during periods of intensive elk use. This would be done to reduce stress from human activity and harassment.

APPENDIX 3

Appendix 3

METHODOLOGIES USED FOR DETERMINING PRESENT AND PREDICTED CONDITIONS

Data taken from the 1963 Range Survey was used to determine present forage production for the vegetative types found within the proposed AMPs. Since the information is over ten years old and did not cover all areas within the allotments in the ES area, additional information was supplied by Phase I Watershed Survey Transects on 34 allotments (381,231 acres) and transects conducted by BLM range conservationists who designed the AMPS on 40 allotments (394,986 acres). Ten of these 40 allotments (221,245 acres) also had Phase I Watershed Survey Transects conducted on them.

The procedures and methods used in estimating the present forage production on these areas and establishing the initial stocking rates presented in the proposed action utilized this data.

The methods used to collect the data included the ocular reconnaissance method (1963 Range Survey), 100-point line transect (Phase I Survey), and 100 step-point transect (BLM range conservationists). All three methods produce the same basic type of data in respect to type and percent of basal ground cover (vegetation, litter, bare ground, small or large rock), percent plant cover by species (composition), and usable forage vegetation by species.

Further observations made in the area of the Phase I Watershed Survey and BLM AMP transects included information on exposure, elevation, source of moisture at the site, class of livestock, wildlife, and soil surface factors. In addition, the location of the transect was recorded. A photograph of the vegetation on the transect and another of a general view were often taken for greater ease in locating the transect area again and to give a visual view of any changes that may occur in vegetation and condition.

Once the actual data was compiled, the percent of each species making up the vegetative composition was multiplied by the Proper Use Factor (PUF) for each species. (A PUF represents the average weight percentage of a particular plant species, in relation to all other species, that can be safely grazed without restricting forage capacity production. Certain forage species are preferred above others; therefore, PUFs of each species vary according to grazing animals' preference and range from 0 to 70 percent.) The value derived from each species was then totaled to get the average PUF of the type of animal using the forage. Once the average PUF was obtained, it was multiplied by the vegetative percent cover for the area. (The average vegetative percent cover is the percent of total ground area covered by living plants; in this case, only basalar or mainstem portions of the plants were considered.)

The product of this multiplication is called the Forage Acre Factor (FAF), which is theoretically that portion of an acre which has a complete aerial cover of usable forage. Since all of the acres in the vegetative type may not be utilizable by livestock, due to steepness or accessibility, the FAF is then multiplied by the utilizable acres, expressed as a percentage of the total acres, to derive the Net Forage Acre Factor (Net FAF). This figure represents the average of all acres included in the analysis that is covered by vegetation and how much of that acreage and vegetation can be utilized by livestock.

The next step in calculating the present forage production was to determine Forage Acre Requirements (FARs) for the Grand Junction ES area. A FAR is that part of a forage acre necessary to support one AUM for one month without injury to the range resource. The FARs used were .35, .43, and .68 and were compiled from actual use data collected on specific pastures in the ES area in 1963, 1965, and 1973. Depending on location, the FAR used on each allotment was divided by the net FAF for each vegetative type and the results represent the average number of acres needed to support one AUM (ac/AUM).

The ac/AUM value was then divided into the total acres in each vegetative type to get an estimate of the total number of AUMs available in each pasture. By comparing the total number of AUMs available on all vegetative types derived with this procedure with the present stocking rate on the allotment, it was determined whether the allotment was being stocked at a proper level or being overstocked. Figure A3-1 is an example of a summary of a Forage Survey Type Writeup for the grass vegetative type in pasture one of the Colorado-Black Ridge Allotment no. 130.

The 88 AMP (less intensive) allotments (79,210 acres) and eleven allotments (281,957 acres) with existing AMPs did not have present production determined on them. Present livestock and wildlife use was compared with range trend and condition by allotment to establish estimated present forage production. These areas are in fair to good condition with static or upward trend and were assumed to have proper use occurring at present. Thus, production is at least equal to or greater than the use that presently occurs on most of these areas. Taking a conservative approach, allotment livestock and wildlife use under these conditions was assumed to be equal to allotment forage production.

The methodologies explained here were used to get an approximation of the present forage production for grazing animals (measured in AUMs) for the proposed AMPs in the Grand Junction ES area. The results acquired from this analysis are not intended to be taken as or to replace a formal range survey.

Procedures for Estimating Soil Productivity Potential by Soil Association/Vegetative Type

Step 1

The first step was to determine the total pounds of vegetation that would be produced per acre within each of the soil associations. The production (total pounds of dry vegetation) for the individual soils was obtained from Soil Conservation Service (SCS) Soil Survey reports, printouts, and range site descriptions. (Each soil has been placed in a range site by the SCS, and then, through clippings on relict areas of each site, each site has been rated for its potential to produce vegetation in an average year based on climax vegetation.) The potential for the association was obtained by taking the percent of individual soils in the association and multiplying this by its production potential and then adding them together for a weighted average. Table A3-1 shows, as an example, the total production by soil association for Colorado-Black Ridge Allotment, no. 130.

Step 2

In each pasture, soil associations were identified by vegetative type. The number of acres within each category was measured by planimeter, by subjective review, or (if the entire area in a pasture was public lands and in the same soil association and vegetation type) by taking the acreage directly from the AMP.

Step 3

After the number of acres in each pasture by association/vegetation type was determined, it was multiplied by the soil productivity potential for that association, giving the total pounds of forage production that would be potentially produced. The potential production was then divided by a requirement of 1,800 pounds per AUM (720 for livestock consumption or 40 percent utilization of the total potential annual forage production and 1080 for plant maintenance and soil protection), which would be the amount of vegetation that would be necessary to maintain an AUM without deteriorating the range, as well as including unsuitable forage, etc. This step resulted in the potential number of AUMs that a pasture would be able to support.

Methodology for Assigning Range Condition Classes

Erosion condition classes (see Soils in chapter 2 for description) and the classification of plant species as desirable, intermediate, and least desirable were used to determine range condition. The following criteria were used in the plant classification process:

1. Desirable plants are those which are palatable, productive, and nutritious forage species; are often dominant under climax or near-climax conditions; are long-lived; and have extensive root systems to aid in protecting the watershed against erosion. This category includes the important key forage species (grasses, forbs, browse, and shrubs) which are to be maintained or increased by intensive livestock management.
2. Intermediate plants are of secondary importance in climax and are usually associated with, or indicators of, ecological successional stages. They replace the desirables as condition deteriorates and replace the least desirables as condition improves. They may be less palatable to grazing animals or be more resistant to grazing use.
3. Least desirable plants include those that are definitely the poorer species in the ecosystem and consist principally of annuals, invaders, and noxious and low-value forage plants.

The erosion condition classes and the above plant classifications result in the following range condition criteria:

1. Good Condition: Composition is 40 percent or more of both desirable and intermediate species, with at least 20 percent made up of desirable species. Erosion condition class is slight to stable.
2. Fair Condition: Composition is 20 to 39 percent of desirable and intermediate species with 5 or more percent made up of desirable

Figure A3-1

Form 4412–1
(November 1970)

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORAGE SURVEY TYPE WRITEUP
(OCULAR RECONNAISSANCE METHOD)

Writeup No. 01240

Date 1975

Aerial Photo No.

Examiner Motz, Pearson	KIND OF GRAZING ANIMAL *	SEASON OF USE	SECTIONS	TWP.	RGE.	MER.
Type 012	Cattle	W-SP-S	16,6	10S	103W	6th
Ac/AUM			20,16	11S	102W	6th

	SPECIES	TOTAL ALLOWABLE PUF	% COMPOSITION	CATTLE PUF	COMP. X C PUF	SHEEP PUF	COMP. X S PUF	DEER PUF	COMP. X D PUF	PUF	COMP. X ___ PUF
GRASSES	Brte		52	.30		.1560					
	Hija		11	.60		.0660					
	Stco		2	.40		.0080					
	Elam		4	.40		.0060					
	Orhy		2	.55		.0110					
	Sp. spp.		2	.45		.0090					
	Ag sm		4	.60		.0240					
	Sihy		1	.30		.0030					
	Poa		1	.60		.0060					
	SUBTOTAL		79								
FORBS	Misc		3	.05		.0015					
	Forb 1		1	.05		.0005					
	Forb 2		T	0		0					
	Forb 3		T	0		0					
	SUBTOTAL		4								
SHRUBS	P-J		4	0		0					
	Gusa		5	0		0					
	Opuntia		T	0		0					
	Artr		3	.05		.0015					
	Atca		1	.10		.0010					
	Save		1	0		0					
	Eula		1	.10		.0010					
	Misc.		2	0		0					
	SUBTOTAL		17								
	TOTALS		100		.3045						

Av C PUF .3045 × Av Den .42 = FAF .1278 × 100 % Util = Net FAF .1278; FAR .68 ÷ Net FAF .1278 = 5.32 Ac/AUM

Av S PUF ____ × Av Den ____ = FAF ____ × ____ % Util = Net FAF ____; FAR ____ ÷ Net FAF ____ = ____ Ac/AUM

Av D PUF ____ × Av Den ____ = FAF ____ × ____ % Util = Net FAF ____; FAR ____ ÷ Net FAF ____ = ____ Ac/AUM

Av ___ PUF ____ × Av Den ____ = FAF ____ × ____ % Util = Net FAF ____; FAR ____ ÷ Net FAF ____ = ____ Ac/AUM

Total Net FAF ____; FAR ____ ÷ Net FAF ____ = ____ Ac/AUM

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* Livestock and major game species. *(Other game species making inappreciable use are:*

TABLE A3-1

EXAMPLE OF PROCEDURE FOR DETERMINING SOIL PRODUCTION POTENTIAL

Allotment: #130 Colorado-Black Ridge
Acres Public Land: 16,468
Acres Private land: 826
Present Production: 1,635 AUMs

Pasture No.	Acres Public	Acres Private	Grazable Acres	Soil Association No.	Soil Productivity Potential by Assoc. #'s of Dry Veg./Ac.	Potential Forage Productivity by Pasture	
						#'s of Veg.	AUMs[1/]
1	5,558		4,932	96	403	1,987,596	1,105
		306	306	96	403	123,318	69
2	6,280		6,280	96	403	2,530,840	1,406
3	4,630		4,630	96	403	1,869,378	1,039
		520	520	96	403	266,240	148
Totals	16,468	826	16,668			6,777,372	3,767

1/ Allow 1,800 pounds of vegetation per AUM.

species. Erosion condition class is less than critical. Also, those ecosystems where the composition comprises 60 percent or more of intermediate species and less than 5 percent of desirable species will be rated fair in condition when the erosion condition class is moderate to stable.

3. Poor Condition: Composition is less than 20 percent desirable and intermediate species. Erosion condition class is critical to severe. (It should be noted that if the erosion condition class is critical to severe, the site is rated in poor condition regardless of the plant composition.)

Plant density and production were also evaluated when assigning range condition classes. Range condition values were assigned at time of AMP development. The data used in assigning the values was derived from the same transects that were used to determine present forage production on the allotments.

Trend was also determined for the areas at the same time as range condition. Little past information on range trend is available for the ES area. For those areas which had no trend information at time of AMP development, BLM range conservationists made ocular observations of trend indicators on the allotments. Through observation of plant vigor, reproduction, seedling establishment, and litter accumulation estimates of the apparent trend of range condition were determined. If these four indicators appeared to be good or increasing the apparent trend was considered to be upward.

BLM range conservationists made several ocular surveys to collect data during field visits to the allotments. These surveys were used to determine the present apparent trend, and to reinforce existing data to insure the range condition was interpreted correctly, especially on those areas which had transects conducted prior to 1970. For example, an allotment in pinyon-juniper vegetative type could have the present situation shown in figure A3-2. According to these criteria this allotment would be rated in fair range condition with an upward trend.

Methodology for Determining Predicted Vegetation Production

Predicted production numbers for allotments in the ES area are conservative estimates based on experience, judgement, and the use of applicable studies. Consideration was first given to the present situation of each allotment, including the following vegetation evaluation components: present production, vegetation density, key species composition, range condition, and apparent range trend. No rigorous estimates were made solely on the basis of climax vegetation conditions as adjusted by existing range condition class. Instead, potential productivities of the soils by pasture in each allotment were calculated on the basis of climax vegetation and used as a ceiling in predicting future production.

Next, the proposed action for each allotment was analyzed with respect to the present situation. Aspects of the proposal which were applied include class of livestock, season of use, grazing system (including range facilities), and an estimate of the present amount of wildlife use.

From this analysis, predictions were made for each allotment with and without the proposal. Applicable studies included studies of similar allotment management plans (AMPs) in the Grand Junction District and cited studies, such as Douglas 1915, King and Merrill 1960, Hormay 1970, Johnson 1965, Mclean and Tisdale 1972, and Ratliff, Reppert, and McConnen 1972. These cited studies were related to this area by considering the overall climate of this area in relation to the climates of the cited studies.

Predicted Production Methods Example

Colorado-Black Ridge, allotment 130, has a vegetative production of 1,635 AUMs of utilizable livestock forage at proper use levels (1963 range survey). Potential production based on soil productivity potential is 3,549 AUMs. Presently, 1,118 AUMs of cattle use occurs between December 16 and June 4. Present range condition by vegetative type is shown in table 3-3 and apparent trend is static on all of the 15,842 acres.

The proposal would allow 1,118 AUMs of cattle use from December 16 to May 30 under a three-treatment, deferred rotation grazing system. Wildlife use the area during the winter, so the 517 AUMs of livestock forage not utilized by cattle would be available for wildlife. The proposal also includes 1.1 miles of fence for dividing the allotment into three pastures, and five reservoirs.

Predicted production for the year 2000 on Colorado-Black Ridge allotment is based on season of use and expected vegetation response. The proposed three-pasture grazing system would provide rest to the key forage species on approximately two-thirds of the allotment acreage annually. Therefore, in one three-year cycle, the entire allotment would have received two years of rest during the spring growing season. Since no summer or fall grazing is proposed, vegetation would be provided with ample opportunity to complete its growth cycle. Data from existing, fully-implemented AMPs in the Grand Junction District with similar grazing systems and season-of-use patterns has shown increases in forage production from 0 to 10 percent within ten years of implementation. After comparison of soils, precipitation, topography, vegetation types involved, and the aforementioned applicable

Growth Form of Desirable and Intermediate Species.

Mature	85%
Seedlings	10%
Decadent	05%
	100

Vigor

desirable species	fair
intermediate species	good

Soil Surface Factor = 45 (Moderate Erosion Condition Class)

Plant Density = 30 percent

Litter = 20 percent

Plant Species	Percent Species Composition
Desirable	
Indian ricegrass (Orhy)	3
Galleta (Hija)	5
Intermediate	
Bottlebrush squirreltail (Sihy)	12
Sandburg bluegrass (Pose)	5
Undesirable	
Pinyon (Pied)	5
Juniper (Juos)	52
Cheatgrass (Brte)	15
Snakeweed (Gusa)	3
	100

Figure A3-2. Example of criteria for determining present range condition class on an allotment in pinyon-juniper vegetation type.

studies that analyze similar responses of grazing systems in an area with an overall climate much like the ES area, production in the year 2000 is predicted to be 1,985 AUMs for livestock and wildlife use.

Methodology for Determining Future Range Condition Classes and Trend

The present range condition and trend information was derived from AMPs. Changes recorded in studies of grazing systems in effect for several years within the ES area and the Grand Junction District were used to help estimate expected changes in range condition and trend. Comparisons of vegetation transect data collected on vegetation manipulation projects conducted in the ES were also used as indicators of changes that could be expected.

On the Timber Ridge Allotment (no. 137), which is situated at 7575 feet average elevation and has northwest-facing slopes, 1000 acres of pinyon-juniper and big sagebrush was chained and seeded to 8 pounds of crested wheatgrass and 1 pound of yellow sweet clover per acre in December 1960. By December 1965 there was an increase in forage from 20 acres per AUM to 5 acres per AUM. This is a 400 percent increase in forage within five years (see figures 3-1 and 3-2). The chaining and seeding projects would result in a long-term, highly beneficial impact as increased forage would be available for livestock and wildlife use. There is some evidence that increased soil moisture, vegetation, and litter ground cover could also be achieved within the first year of the chaining (Gifford and Tew 1969, Gifford 1973).

Field observations and comparison of photographs (BLM Grand Junction) taken before and after a brush beating conducted in 1967 on Brush Mountain Allotment (no. 705) indicates that grass forage production has doubled (see figures 3-3 and 3-4).

The Pine Ridge fire occurred on Winter flats Allotment (no. 713) in July of 1971 on a predominately pinyon-juniper vegetation type, with scattered sagebrush parks, mountain shrub, and ponderosa pine found within the burn. The elevation of the area was approximately 6,500 feet and the fire covered 325 acres. The burned area was seeded with annual rye (*Secale cereale*) to prevent any immediate erosion and as a cover crop for the perennial western wheatgrass, sand dropseed, and Indian ricegrass. The area is included in an existing AMP and was rested for two years following the burn. Field observations and comparison of this area with adjacent unburned areas of the same type indicates that forage production on the burned area is more than triple that on the adjacent unburned areas (see figures 3-5 and 3-6).

Studies by McLean and Tisdale 1972, Hormay 1970, Gifford and Tew 1969, King and Merrill 1960, and Martin 1975 were also used to help estimate expected changes. These studies were found applicable since they measured response of vegetation under grazing systems and vegetation manipulation projects.

One of these studies (King and Merrill 1960) found that a 25 percent increase in range condition could be expected with implementation of grazing systems. A 25 percent increase under this method of classification would correspond to a one-condition class change under the BLM system.

This may be supported by the data shown in figure A3-3 comparing the season long and rest rotation grazing systems located on the Naval Oil Shale Reserve. Additional support may be gathered from the following situation.

Figure A3-4 portrays a hypothetical summer range allotment of 640 acres through four years under three livestock grazing situations. A comparison is drawn between the practices of grazing an entire allotment for the entire season (season-long grazing) and grazing portions of the allotments through specified periods to meet plant needs (rest rotation grazing). The rest rotation plan shown is the simplest form of a rest rotation system with three pastures. All three grazing systems under the proposed action seek to shorten the time livestock are on any one piece of ground, detouring use around critical plant growth phases.

Note that AUMs are a function of the number of animals over a period of time. It is therefore a measure of grazing pressure. In this example, the operator has 30 head of cattle on the allotment for three months, resulting in 90 AUMs of use.

Compare the idealistic season-long grazing situation with the rest rotation grazing diagram. It is seen that livestock use is one-third less on all areas under season-long grazing than on the grazed pastures under rest rotation. However, *two-thirds* of the range is being rested at any one time under rest rotation (one-third rested all season long, one-third rested half the season). No area is rested during the grazing season in the season-long situation. Thus forage plants on season-long grazing areas must annually regain vigor during the time livestock are present and grazing preferentially on the regrowth.

Under the rest rotation plan, livestock are at three times the stocking rate of the idealized season-long situation, but are there for half the time. This results in a 50 percent net increase in use, but more of these AUMs of use are composed of less desirable plant species, since the time for the animals to return to preferred individual plants is too limited for much regrowth to have occurred.

NAVAL OIL SHALE RESERVE AREA

Situation:

Allotments	Grazing System	Year Imp.	% Reduction in Livestock AUMs
JQS	Rest Rotation	1966	20
East Fork	Rest Rotation	1966	20
Clough-Alber	Season Long	1966	61

Key areas (draws and valley bottoms) were evaluated in 1973 and the data from the two rest rotation systems were compared with the data from the season long system.

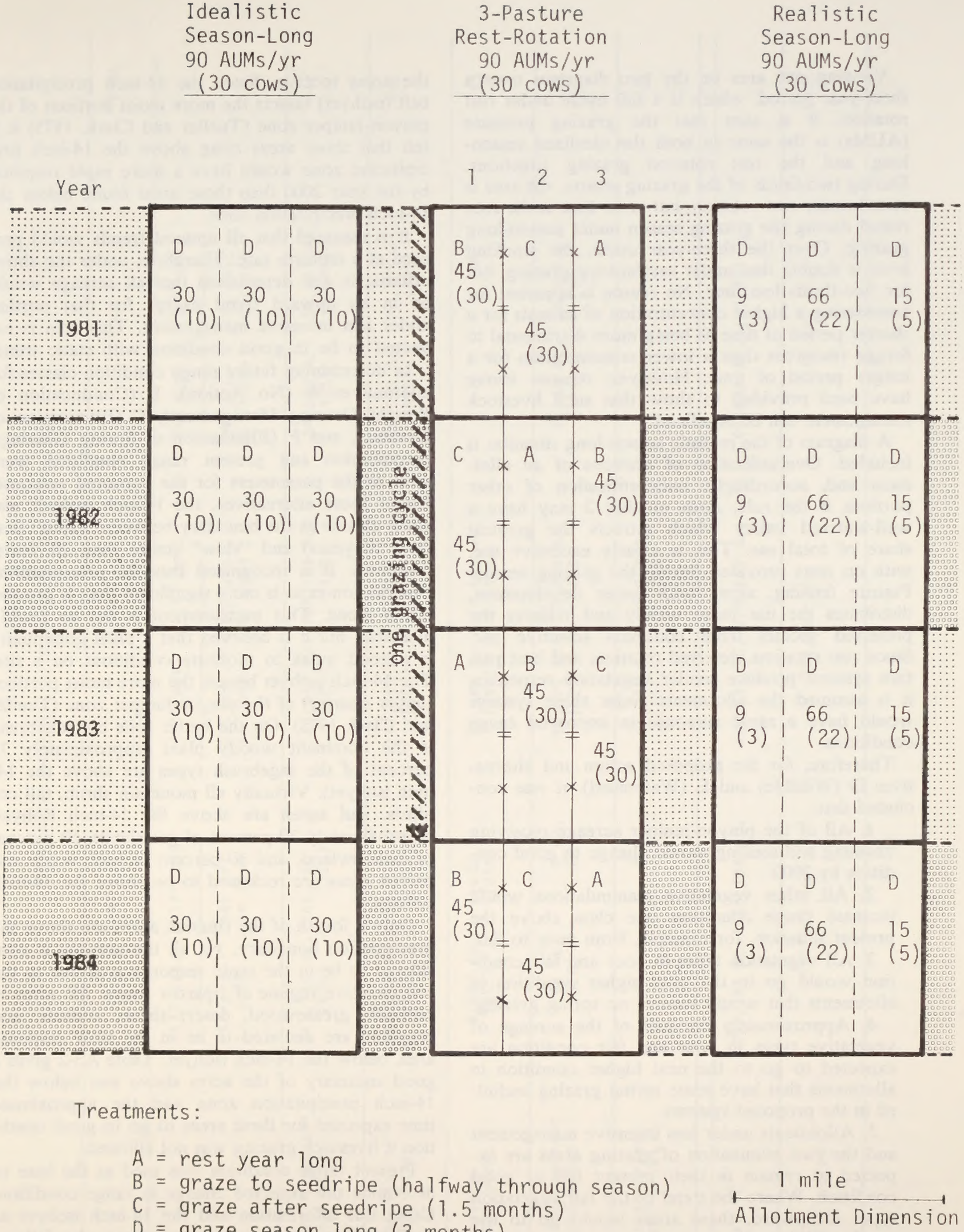
Results:

		Rest Rotation	Season Long
	Desirable species (D)	32%	16%
	Intermediate species (I)	36%	34%
	Undesirable species (U)	32%	50%
		100%	100%
Average Species Composition			
I	Bluegrasses	30%	32%
D	Western Wheatgrass	6%	4%
D	Mountain Brome	13%	2%
D	Columbia Needlegrass	13%	8%
U	Forbs	32%	50%
D	Forbs	0%	2%
I	Shrubs	6%	2%
		100%	100%
Cover		34%	13%
Bare Ground		35%	64%

Range Condition

Analysis of the data collected on the key areas indicates that a one condition class change, from low fair and poor to high fair and good, has occurred in the seven years since implementation of the rest rotation grazing systems on the JQS and East Fork allotments. Range condition on the Clough-Albers allotment, which is under season long grazing, remains in low fair and poor condition even though they had a larger reduction in AUMs of grazing use.

Figure A3-3. Naval Oil Shale Reserve Area.



Treatments:

A = rest year long
B = graze to seedripe (halfway through season)
C = graze after seedripe (1.5 months)
D = graze season long (3 months)

Figure A3-4. Diagram study of three livestock grazing propositions.

Viewing one area on the two diagrams over a three-year period, which is a full cycle under rest rotation, it is seen that the grazing pressure (AUMs) is the same in both the idealized season-long and the rest rotation grazing situations. During two-thirds of the grazing season, the area is rested under rest rotation, but at no time is the area rested during the grazing season under season-long grazing. Over the three-year cycle, the stocking level is double that under season-long grazing, but for two-thirds less time. No reason is apparent for considering a higher concentration of animals for a shorter period of time as being more detrimental to forage resources than a lower concentration for a longer period of time. However, reasons above have been provided to show that such livestock management can be beneficial.

A diagram of the realistic season-long situation is included. Overutilization of portions of an allotment and, accordingly, underutilization of other portions is the rule. Area number 2 may have a well-watered valley which attracts the greatest share of total use. This is clearly excessive use, with no rests provided during the grazing season. Pasture fencing, along with water development, distributes the use more widely and relieves the preferred species from continual selective use. Since rest rotation, deferred rotation, and best pasture systems produce similar vegetation responses, it is assumed the allotments under these systems would have a rapid response in improved range conditions.

Therefore, for the proposed action and alternatives D (Wildlife) and E (Watershed), it was concluded that:

1. All of the pinyon-juniper acreage receiving chaining and seeding would change to good condition by 2000.
2. All other vegetative manipulations would increase range condition one class above the present situation, for example, from poor to fair.
3. All vegetation types in poor and fair condition would go to the next higher condition in allotments that would receive no spring grazing.
4. Approximately one-half of the acreage of vegetative types in poor and fair condition are expected to go to the next higher condition in allotments that have some spring grazing included in the proposed systems.
5. Allotments under less intensive management and the two elimination of grazing areas are expected to remain in their present fair or good condition. Where the trend of the fair vegetation types is upward, these areas would go to the good condition class.

The response time for the vegetative types to go from poor to fair, poor to good, or fair to good is largely controlled by the amount of precipitation the areas receive. Since the 14-inch precipitation belt (isohyet) bisects the more moist portions of the pinyon-juniper zone (Tueller and Clark, 1975) it is felt that those areas lying above the 14-inch precipitation zone would have a more rapid response by the year 2000 than those areas found below the 14-inch precipitation zone.

It is assumed that all upward trends would proceed at a uniform rate. Therefore, under the above criteria, it was determined that all acreage would be in an upward trend except for that portion under less intensive management. This area is expected to be in good condition with static trend.

In determining future range condition classes for alternatives A (No Action), B (Continuation of Present Grazing Management), C (Elimination of Grazing), and F (Elimination of Spring Grazing), precipitation and present range condition were used as the parameters for the expected response. Under these alternatives, the 14-inch isohyet was again chosen as the boundary between "rapid" (less than 20 years) and "slow" (more than 20 years) responses. It is recognized that the precipitation/evaporation ratio is more significant than is precipitation alone. This measurement is not so readily available, but it is believed that a plant community is a good index to moisture conditions on a site. The 14-inch isohyet bisects the more moist portions (upper quarter) of the pinyon-juniper zone (Tueller and Clark 1975). On the better soils big sagebrush is the dominant woody plant (approximately 75 percent of the sagebrush types are above the 14-inch isohyet). Virtually all mountain shrub, tall conifers, and aspen are above the 14-inch isohyet. Approximately 70 percent of grasslands, 60 percent of meadowland, and 30 percent of both waste and barren areas are reckoned to be above the 14-inch isohyet.

Only a fourth of the riparian acres are above the precipitation boundary, yet all the acreage is considered to be in the rapid response area due to the soil moisture regime of riparian zones. All acres in saltbush, greasewood, desert shrub, annuals, and cropland are declared to be in the slow response area, below the 14-inch isohyet. Table A3-2 gives a good summary of the acres above and below the 14-inch precipitation zone and the approximate time expected for these areas to go to good condition if livestock grazing was not allowed.

Present range condition was used as the base to determine the expected change in range condition. Using this information and the 14-inch isohyet as the boundary between response times, the following criteria were developed and applied to alternatives A, B, C, and F to determine the expected range condition class change by the year 2000.

TABLE A3-2

VEGETATION RESPONSE WITH ELIMINATION OF GRAZING

	Poor		Fair		Good		TOTAL
	<14" ppt.	>14" ppt.	<14" ppt.	>14" ppt.	<14" ppt.	>14" ppt.	
	>40 yrs. to good	<40 yrs. to good	>20 yrs. to good	<20 yrs. to good	+30 yrs. to climax	+20 yrs. to climax	
Deferred Rotation 526,836 acres	141,910 Ac. (68%)	66,781 Ac. (32%)	148,843 Ac. (58%)	107,783 Ac. (42%)	24,608 Ac. (40%)	36,911 Ac. (60%)	44%
Rest Rotation 535,035 acres	140,840 Ac. (72%)	54,771 Ac (28%)	117,790 Ac. (58%)	85,296 Ac. (42%)	69,532 Ac. (51%)	66,806 Ac. (49%)	44%
Best Pasture 43,889 acres	8,602 Ac. (65%)	4,632 Ac. (35%)	18,086 Ac. (59%)	12,569 Ac. (41%)	0	0	4%
Reduced Management 79,210 acres	33 Ac. (100%)	0 Ac. (0%)	40,300 Ac. (67%)	19,849 Ac. (33%)	2,664 Ac. (14%)	16,364 Ac. (86%)	7%
No Grazing Areas 15,887 acres	0	0	11,915 Ac. (75%)	3,972 Ac. (25%)	0	0	1%
Subtotal	291,385 Ac.	126,184 Ac.	336,934 Ac.	229,469 Ac.	96,804 Ac.	120,081 Ac.	
TOTAL 1,200,857 acres	417,569 Ac.		566,403 Ac.		216,885 Ac.		100%

Methodology for Determining Sheet Erosion

Sheet erosion by water may be estimated by using an equation developed by G.W. Musgrave. The equation was developed from measured erosion rates on plots with 10 percent slope, 72.6-foot slope length, and a rainfall of 1.375 feet. The equation is as follows:

$$E = FR\,(S/10)^{1.35}\,(L/72.6)^{0.35}\,(P/1.375)^{1.75}$$

where:

E = sheet erosion in tons/acre/year

F = basic erosion rate of bare soil in tons/year

R = cover factor

S = average slope of contributing area in percent

L = length of longest contributing meander waterway in feet (field measurement)

P = maximum two-year frequency, 30-minute rainfall in inches

Methodology for Determining Present and Predicted Erosion Condition Classes

Erosion condition classes are a measure of erosion activity as expressed by numerical values (0 to 100) of soil surface factors (SSF). Seven categories of surface features are considered by the BLM range conservationist in the examination of the area represented by each transect. These features are soil movement, surface litter, surface rock, pedestalling, rills, flow patterns, and gullies.

Five erosion condition classes have been used to depict current erosion by assigning numerical soil surface factors: stable (SSF 0 tp 20), slight (SSF 21 to 40), moderate (SSF 41 to 60), critical (SSF 61 to 80), and severe (SSF 81 to 100).

In determining the SSF, the field person considers the seven features listed above over the total area of the vegetative subtype, not just in the immediate area of the transect. BLM Manual Section 7322, “Watershed Conservation and Development System”, is used as a guide in making SSF determinations.

The present SSF is that which is actually observed as being representative of the transect area. This SSF is used as a base point for determining future changes in erosion activity.

The future SSF with intensive management (implementation of the proposed action) is an estimate of erosion activity after twenty years. Estimates are based on observations of other areas that have intensive management systems now in effect. They can also be determined through comparison areas, such as exclosures, with similar climatic and topographic conditions and soils.

The BLM Form 7310-12 shown in figure A3-5 illustrates the change in SSF which may occur in the future with intensive management. The example refers to the Bull Hill-Maverick Allotment. The field person has determined the present SSF to be 43. A SSF rating of 43 places this area in the moderate erosion condition class.

After making comparisons between the transect area and similar areas under intensive management, the field person determines the future SSF would be 40. This rating moves the transect area into the slight erosion condition class. Through this determination, the field person has estimated that the surface features of soil movement, surface litter, rills, flow patterns, and gullies would improve, resulting in an improved erosion condition class, that is, from moderate to slight. Figure A3-5 illustrates the change.

If, however, the present SSF was a 58, then the future SSF would probably remain in the moderate erosion condition class. Thus, the erosion condition class may or may not result in an improvement with AMP implementation, even though the SSF improves.

Usually, there are many transects which comprise an allotment. Therefore, a change in only one transect may result in only a minor change in erosion condition classes allotment-wide.

Each alternative was evaluated in a similar manner. However, in many instances, data gaps existed. Thus, for quantification estimates, several assumptions were necessary. These assumptions are listed for each alternative discussed below.

No Action

For those six existing AMPs in which range condition and trend is upward, erosion condition classes would improve (same as proposed action). However, for the five AMPs where range condition and trend is static, erosion would remain the same as it is at present.

Since vegetation condition is expected to remain static or only slightly decline on the remaining public lands, erosion condition classes would remain essentially unchanged. Figure A3-6 shows how a typical allotment was evaluated under this alternative.

Continuation of Present Grazing Management

The assumptions used to quantify erosion condition classes were based upon the vegetation response section. In the vegetation section, 33 of the 78 proposed allotments would show an upward trend. Since range trend would be upward, slight decreases in erosion would most likely occur. Thus, if any SSF was within 3 to 4 points of the

Figure A3-5

Form 7310-12
(May 1973)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

DETERMINATION OF EROSION CONDITION CLASS
SOIL SURFACE FACTORS (SSF)

By
Date
Location: Bull Hill - Maverick
Treatment affecting the SSF: Present Situation

SOIL MOVEMENT*	No visual evidence of movement 0 1 2 3	Some movement of soil particles 4 5	Moderate movement of soil is visible and recent. Slight terracing generally less than 1" in height 6 [✓ 7] 8	Occurs with each event. Soil and debris deposited against minor obstructions. 9 10 11	Subsoil exposed over much of area, may have embryonic dunes and wind scoured depressions 12 13 14
SURFACE LITTER*	Accumulating in place 0 1 2 3	May show slight movement 4 5 6	Moderate movement is apparent, deposited against obstacles [✓ 7] 8	Extreme movement apparent, large and numerous deposits against obstacles 9 10 11	Very little remaining *(use care on low productive sites)* 12 13 14
SURFACE ROCK*	If present, the distribution of fragments show no movement caused by wind or water 0 1 2	If present, coarse fragments have a truncated appearance or spotty distribution caused by wind or water 3 4 [✓ 5]	If present, fragments have a poorly developed distribution pattern caused by wind or water 6 7 8	If present, surface rock or fragments exhibit same movement and accumulation of smaller fragments behind obstacles 9 10 11	If present, surface rock or fragments are dissected by rills and gullies or are already washed away 12 13 14
PEDESTALLING*	No visual evidence of pedestalling 0 1 2 3	Slight pedestalling, in flow patterns 4 5 6	Small rock and plant pedestals occurring in flow patterns [✓ 7] 8 9	Rocks and plants on pedestals generally evident, plant roots exposed 10 11	Most rocks and plants pedestalled and roots exposed 12 13 14
FLOW PATTERNS*	No visual evidence of flow patterns 0 1 2 3	Deposition of particles may be in evidence 4 5 6	Well defined, small, and few with intermittent deposits [✓ 7] 8 9	Flow patterns contain silt and sand deposits and alluvial fans 10 11 12	Flow patterns are numerous and readily noticeable. May have large barren fan deposits. 13 14 15
RILLS	No visual evidence of rills 0 1 2 [✓ 3]	Some rills in evidence at infrequent intervals over 10' 4 5 6	Rills ½" to 6" deep occur in exposed places at approximately 10' intervals 7 8 9	Rills ½" to 6" deep occur in exposed area at intervals of 5 to 10' 10 11 12	May be present at 3" to 6" deep at intervals less than 5' 13 14
GULLIES	May be present in stable condition. Vegetation on channel bed and side slopes 0 1 2 3	A few gullies in evidence which show little bed or slope erosion. Some vegetation is present on slopes. 4 5 6	Gullies are well developed with active erosion along less than 10% of their length. Some vegetation may be present. [✓ 7] 8 9	Gullies are numerous and well developed with active erosion along 10 to 50% of their lengths or a few well developed gullies with active erosion along more than 50% of their length 10 11 12	Sharply incised gullies cover most of the area and over 50% are actively eroding 13 14 15

SITUATION	TOTAL				
Present	43				

Erosion Condition Classes: Stable 0–20; Slight 21–40; Moderate 41–60; Critical 61–80; Severe 81–100

(Instructions on reverse)

Form 7310-12
(May 1973)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

DETERMINATION OF EROSION CONDITION CLASS
SOIL SURFACE FACTORS (SSF)

By
Date
Location: Bull Hill - Maverick
Treatment affecting the SSF: AMP Implementation

SOIL MOVEMENT*	No visual evidence of movement 0 1 2 3	Some movement of soil particles 4 5	Moderate movement of soil is visible and recent. Slight terracing generally less than 1" in height. [✓ 6] 7 8	Occurs with each event. Soil and debris deposited against minor obstructions. 9 10 11	Subsoil exposed over much of area, may have embryonic dunes and wind scoured depressions 12 13 14
SURFACE LITTER*	Accumulating in place 0 1 2 3	May show slight movement 4 5 [✓ 6]	Moderate movement is apparent, deposited against obstacles 7 8	Extreme movement apparent, large and numerous deposits against obstacles 9 10 11	Very little remaining *(use care on low productive sites)* 12 13 14
SURFACE ROCK*	If present, the distribution of fragments show no movement caused by wind or water 0 1 2	If present, coarse fragments have a truncated appearance or spotty distribution caused by wind or water 3 4 [✓ 5]	If present, fragments have a poorly developed distribution pattern caused by wind or water 6 7 8	If present, surface rock or fragments exhibit same movement and accumulation of smaller fragments behind obstacles 9 10 11	If present, surface rock or fragments are dissected by rills and gullies or are already washed away 12 13 14
PEDESTALLING*	No visual evidence of pedestalling 0 1 2 3	Slight pedestalling, in flow patterns 4 5 6	Small rock and plant pedestals occurring in flow patterns [✓ 7] 8 9	Rocks and plants on pedestals generally evident, plant roots exposed 10 11	Most rocks and plants pedestalled and roots exposed 12 13 14
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RILLS	No visual evidence of rills 0 1 2 [✓ 3]	Some rills in evidence at infrequent intervals over 10' 4 5 6	Rills ½" to 6" deep occur in exposed places at approximately 10' intervals 7 8 9	Rills ½" to 6" deep occur in exposed area at intervals of 5 to 10' 10 11 12	May be present at 3" to 6" deep at intervals less than 5' 13 14
GULLIES	May be present in stable condition. Vegetation on channel bed and side slopes 0 1 2 3	A few gullies in evidence which show little bed or slope erosion. Some vegetation is present on slopes. 4 5 6	Gullies are well developed with active erosion along 10% of their length. Some vegetation may be present. [✓ 7] 8 9	Gullies are numerous and well developed with active erosion along 10 to 50% of their lengths or a few well developed gullies with active erosion along more than 50% of their length 10 11 12	Sharply incised gullies cover most of the area and over 50% are actively eroding 13 14 15

SITUATION	TOTAL				
Proposed Action	40				

Erosion Condition Classes: Stable 0–20; Slight 21–40; Moderate 41–60; Critical 61–80; Severe 81–100

(Instructions on reverse)

Figure A3-6

Form 7310-12
(May 1973)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

DETERMINATION OF EROSION CONDITION CLASS
SOIL SURFACE FACTORS (SSF)

By
Date
Location Bull Hill - Maverick
Treatment affecting the SSF

SOIL MOVEMENT*	No visual evidence of movement 0 1 2 3	Some movement of soil particles 4 5	Moderate movement of soil is visible and recent. Slight terracing generally less than 1" in height 6 [✓ 7] 8	Occurs with each event. Soil and debris deposited against minor obstructions. 9 10 11	Subsoil exposed over much of area, may have embryonic dunes and wind scoured depressions 12 13 14
SURFACE LITTER*	Accumulating in place 0 1 2 3	May show slight movement 4 5 6	Moderate movement is apparent, deposited against obstacles [✓ 7] 8	Extreme movement apparent, large and numerous deposits against obstacles 9 10 11	Very little remaining *(use care on low productive sites)* 12 13 14
SURFACE ROCK*	If present, the distribution of fragments show no movement caused by wind or water 0 1 2	If present, coarse fragments have a truncated appearance or spotty distribution caused by wind or water 3 4 [✓ 5]	If present, fragments have a poorly developed distribution pattern caused by wind or water 6 7 8	If present, surface rock or fragments exhibit same movement and accumulation of smaller fragments behind obstacles 9 10 11	If present, surface rock or fragments are dissected by rills and gullies or are already washed away 12 13 14
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SITUATION	TOTAL
No Action	43

Erosion Condition Classes: Stable 0–20; Slight 21–40; Moderate 41–60; Critical 61–80; Severe 81–100

(Instructions on reverse)

Form 7310-12
(May 1973)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

DETERMINATION OF EROSION CONDITION CLASS
SOIL SURFACE FACTORS (SSF)

By
Date
Location Bull Hill - Maverick
Treatment affecting the SSF

SOIL MOVEMENT*	No visual evidence of movement 0 1 2 3	Some movement of soil particles 4 5	Moderate movement of soil is visible and recent. Slight terracing generally less than 1" in height. 6 [✓ 7] 8	Occurs with each event. Soil and debris deposited against minor obstructions. 9 10 11	Subsoil exposed over much of area, may have embryonic dunes and wind scoured depressions 12 13 14
SURFACE LITTER*	Accumulating in place 0 1 2 3	May show slight movement 4 5 6	Moderate movement is apparent, deposited against obstacles [✓ 7] 8	Extreme movement apparent, large and numerous deposits against obstacles 9 10 11	Very little remaining *(use care on low productive sites)* 12 13 14
SURFACE ROCK*	If present, the distribution of fragments show no movement caused by wind or water 0 1 2	If present, coarse fragments have a truncated appearance or spotty distribution caused by wind or water 3 4 [✓ 5]	If present, fragments have a poorly developed distribution pattern caused by wind or water 6 7 8	If present, surface rock or fragments exhibit same movement and accumulation of smaller fragments behind obstacles 9 10 11	If present, surface rock or fragments are dissected by rills and gullies or are already washed away 12 13 14
PEDESTALLING*	No visual evidence of pedestalling 0 1 2 3	Slight pedestalling, in flow patterns 4 5 6	Small rock and plant pedestals occurring in flow patterns [✓ 7] 8 9	Rocks and plants on pedestals generally evident, plant roots exposed 10 11	Most rocks and plants pedestalled and roots exposed 12 13 14
FLOW PATTERNS*	No visual evidence of flow patterns 0 1 2 3	Deposition of particles may be in evidence 4 5 6	Well defined, small, and few with intermittent deposits [✓ 7] 8 9	Flow patterns contain silt and sand deposits and alluvial fans 10 11 12	Flow patterns are numerous and readily noticeable. May have large barren fan deposits. 13 14 15
RILLS	No visual evidence of rills 0 1 2 [✓ 3]	Some rills in evidence at infrequent intervals over 10' 4 5 6	Rills ½" to 6" deep occur in exposed places at approximately 10' intervals 7 8 9	Rills ½" to 6" deep occur in exposed area at intervals of 5 to 10' 10 11 12	May be present at 3" to 6" deep at intervals less than 5' 13 14
GULLIES	May be present in stable condition. Vegetation on channel bed and side slopes 0 1 2 3	A few gullies in evidence which show little bed or slope erosion. Some vegetation is present on slopes. 4 5 6	Gullies are well developed with active erosion along less than 10% of their length. Some vegetation may be present. [✓ 7] 8 9	Gullies are numerous and well developed with active erosion along 10 to 50% of their lengths or a few well developed gullies with active erosion along more than 50% of their length 10 11 12	Sharply incised gullies cover most of the area and over 50% are actively eroding 13 14 15

SITUATION	TOTAL
Continue Present Grazing	43

Erosion Condition Classes: Stable 0–20; Slight 21–40; Moderate 41–60; Critical 61–80; Severe 81–100

(Instructions on reverse)

next lower class, then the erosion condition class was lowered. If the SSF was not within 3 or 4 points of the next lower class, the erosion condition class was not changed.

On the other 45 allotments, erosion is expected to remain the same since range trend is expected to remain static.

The change in erosion condition classes for the eleven existing AMPs would be the same as with the proposed action.

The less intensively managed allotments and two elimination of grazing areas would remain unchanged. Figure A3-6 illustrates how a typical allotment was evaluated for Alternative B.

Elimination of Grazing

It is assumed that the total ground cover would be essentially the same as with the proposed action, within five to ten percent. Since total ground cover would be similar, it is assumed that erosion condition classes would be nearly identical to those predicted for the proposed action. Although this is not quite the case, this is the best assumption that can be made, given the lack of data.

Wildlife Alternative

Since reduction in livestock grazing is replaced with increases in wildlife use, erosion condition classes would be identical to those occurring with the proposed action. It is assumed that wildlife use and livestock grazing would cause similar impacts.

Watershed Alternative

Elimination of spring-summer grazing would have significantly beneficial effects on erosion. Similarly, the elimination of spring grazing and shifting of grazing to fall would improve erosion conditions.

Since data gaps existed for this alternative, an assumption was necessary for quantification. Specifically, it was assumed that the SSF would be lowered by three to four points in relation to the SSF values predicted to occur with implementation of the proposal. Therefore, if the SSF predicted to occur with the proposed action was within several points of the next lower class, the erosion condition class was lowered.

Individual transects were considered for each allotment affected by a season of use change under this alternative. Factors evaluated included transect data and location, climatic and topographic conditions, and types of soils present. Figure A3-7 illustrates how a typical allotment was evaluated for this alternative.

Summary

Table A3-3 shows the overall results obtained on a typical allotment using the above methodologies. Despite the many data gaps, the analysis of the impacts arising out of the alternatives is considered to be essentially accurate.

ALTERNATIVE A: NO ACTION

Of the present fair and good condition vegetative types below the 14-inch precipitation zone, 25 percent of the acreage in both classes would be expected to drop to the next lower condition class by the year 2000.

ALTERNATIVE B: CONTINUATION OF PRESENT GRAZING MANAGEMENT

Of the present poor and fair condition vegetative types above the 14-inch precipitation zone, 25 percent of the acreage in both classes would be expected to go to the next higher condition class by the year 2000.

ALTERNATIVE C: ELIMINATION OF GRAZING

Of the present poor and fair condition vegetative types above the 14-inch precipitation zone, 50 percent of the poor acreage would be expected to go to fair and 100 percent of the fair acreage would be expected to go to good condition by the year 2000.

ALTERNATIVE F: ELIMINATION OF SPRING GRAZING

The methodology used to determine the change in range condition class for the 284,957 acres involved with the eleven existing AMPs under this alternative was the same as that used to determine predicted changes under the proposed action. Of the remaining 915,900 acres, 50 percent of the acreage above the 14-inch precipitation zone and in a poor condition class would be expected to go to fair condition, and 75 percent of the acreage above the 14-inch precipitation zone and in a fair condition class would be expected to go to good condition by the year 2000.

Methodology for Determining Big Game Population Increases

Each allotment was analyzed to determine type of big game range (deer, elk, antelope), square miles of suitable habitat, and present population in animals/square mile. DOW projected increases in population by 1993 were used to project a future maximum population increase. Season of big game use was then considered. Deer or elk would be on winter range 5 months or 5/12 of the year. Summer range would be 7/12, intermediate, 2/12, and year long 12/12 or 1.

Figure A3-7

Form 7310-12
(May 1973)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

DETERMINATION OF EROSION CONDITION CLASS
SOIL SURFACE FACTORS (SSF)

By | Date

Location
Bull Hill - Maverick

Treatment affecting the SSF

SOIL MOVEMENT *	No visual evidence of movement 0 1 2 3	Some movement of soil particles 4 [✓ 5]	Moderate movement of soil is visible and recent. Slight terracing generally less than 1" in height. 6 7 8	Occurs with each event. Soil and debris deposited against minor obstructions. 9 10 11	Subsoil exposed over much of area, may have embryonic dunes and wind scoured depressions 12 13 14
SURFACE LITTER *	Accumulating in place 0 1 2 3	May show slight movement 4 [✓ 5] 6	Moderate movement is apparent, deposited against obstacles 7 8	Extreme movement apparent, large and numerous deposits against obstacles 9 10 11	Very little remaining *(use care on low productive sites)* 12 13 14
SURFACE ROCK *	If present, the distribution of fragments show no movement caused by wind or water 0 1 2	If present, coarse fragments have a truncated appearance or spotty distribution caused by wind or water 3 4 [✓ 5]	If present, fragments have a poorly developed distribution pattern caused by wind or water 6 7 8	If present, surface rock or fragments exhibit same movement and accumulation of smaller fragments behind obstacles 9 10 11	If present, surface rock or fragments are dissected by rills and gullies or are already washed away 12 13 14
PEDESTALLING *	No visual evidence of pedestalling 0 1 2 3	Slight pedestalling, in flow patterns 4 5 [✓ 6]	Small rock and plant pedestals occurring in flow patterns 7 8 9	Rocks and plants on pedestals generally evident, plant roots exposed 10 11	Most rocks and plants pedestalled and roots exposed 12 13 14
FLOW PATTERNS *	No visual evidence of flow patterns 0 1 2 3	Deposition of particles may be in evidence 4 [✓ 5] 6	Well defined, small, and few with intermittent deposits 7 8 9	Flow patterns contain silt and sand deposits and alluvial fans 10 11 12	Flow patterns are numerous and readily noticeable. May have large barren fan deposits. 13 14 15
RILLS	No visual evidence of rills 0 1 2 [✓ 3]	Some rills in evidence at infrequent intervals over 10' 4 5 6	Rills ½" to 6" deep occur in exposed places at approximately 10' intervals 7 8 9	Rills ½" to 6" deep occur in exposed area at intervals of 5 to 10' 10 11 12	May be present at 3" to 6" deep at intervals less than 5' 13 14
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SITUATION	TOTAL				
Watershed Effective	35				

Erosion Condition Classes: Stable 0–20; Slight 21–40; Moderate 41–60; Critical 61–80; Severe 81–100

(Instructions on reverse)

Form 7310-12
(May 1973)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

DETERMINATION OF EROSION CONDITION CLASS
SOIL SURFACE FACTORS (SSF)

By | Date

Location
Bull Hill - Maverick

Treatment affecting the SSF

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SITUATION	TOTAL				
Elimination of Spring Grazing	38				

Erosion Condition Classes: Stable 0–20; Slight 21–40; Moderate 41–60; Critical 61–80; Severe 81–100

(Instructions on reverse)

TABLE A3-3

ALTERNATIVE COMPARISON (BULL HILL-MAVERICK)

Erosion Condition Class	Present Situation (Acres)	Proposed Action (Acres)	Cont. of Present Mgmt. (Acres)	No Action (Acres)	Elimin. of Grazing (Acres)	Wildlife Effective (Acres)	Watershed Effective (Acres)	Elim. of Spring Grazing (Acres)
Stable	0	0	0	0	0	0	0	0
Slight	1,460	3,066	2,263	1,460	3,066	3,066	3,550	3,869
Moderate	4,818	6,570	5,694	4,818	6,570	6,570	9,050	6,570
Critical	8,322	4,964	6,643	8,322	4,964	4,964	2,000	4,161
Severe	0	0	0	0	0	0	0	0

Each allotment was rated on a scale of 1 to 10 for condition and for relative importance of the area to wildlife. A high condition rating indicates poor range condition. Each AMP was rated (on a scale of 1 to 5) as to its management potential for wildlife. The AMP management factor was multiplied by the sum of the condition and importance factors.

The resulting number indicates what percent of the DOW's predicted increase will be due to the BLM's grazing management. This number, when multiplied with the predicted maximum population increase and season of use, indicates the increased number of big game which can be attributed to the AMPs. These figures were then totaled to determine an areawide figure for each species.

Example: 6401 Palisade Flats - Deer Winter range - 11.9 square miles of suitable habitat with a present population of 30 animals/square mile.

(11.9 mi^2)(30 animals/mi^2) = 357 animals (357 animals)(DOW projected increase of 125%) = 446 more animals

condition rating = .6 importance rating = .7 = .13 (.13)(management factor of 2) = 26% or .26 (446 animals)(5/12 season of use factor)(.26) = 48.

The Palisade Flats AMP can then be considered to potentially result in 48 more deer.

APPENDIX 4

Appendix 4

METHODOLOGY FOR HYDROLOGIC PREDICTIONS

1. Twelve representative watersheds were chosen on the basis of their geographic locations and vegetative, hydrologic, soil, and climatic characteristics.

2. Each watershed was located on a 7.5 minute topographic map.

3. Vegetative, hydrologic soil group, and allotment overlays were made for each watershed.

4. Each hydrologic response unit (i.e., vegetative type within a given soil type within a given pasture) was planimetered to determine the percent of the total area in the watershed. (A planimeter is an instrument that measures the area of a plane figure as a mechanically coupled pointer traverses the figure's perimeter.)

5. Each hydrologic unit was assigned a cover density using data collected during Phase I of the Bureau of Land Management's (BLM's) Watershed Conservation and Development System. Percent vegetative cover was added to the percent litter and half of the large rock plus small rock to get the cover density used in the Soil Conservation Service (SCS) model for predicting runoff.

6. Infiltration rates were measured within each hydrologic soil group with a double ring infiltrometer.

7. A curve number was assigned to each unit using the equations in table A4-1 where possible and table A4-2 when the soil type within the unit did not coincide with the equations in table A4-1.

8. A weighted curve number was then calculated for each watershed.

9. The rainfall upon which runoff calculations were based was arrived at using the following procedure developed by Fogel and Hekman (1977).

To obtain relationships between elevation and selected precipitation variables, several climatological stations with daily precipitation records were chosen from the Grand Junction Resource Area with the help of the BLM hydrologist. The selected stations and their elevations are as follows: Grand Junction, 4855'; Colorado National Monument 5280'; Rifle, 5400'; Cedaredge, 6180'; and Bonham Reservoir, 9835'. Since the Colorado National Monument and Rifle stations are located at relatively similar elevations, subsequent analyses used average values of these two stations. The two precipitation variables required for simulating a time series of events are precipitation depth and interarrival time.

A 6-month season, May through October, was chosen to represent the time of the year when changes in the hydrologic effects caused by changing the grazing management program would be most noticeable. In that time period storm durations were assumed to be less than one day so that each day in which rainfall was recorded was assumed to be a separate event. While this was not necessarily correct at all times, inspection of the National Weather Service hourly climatological data for Grand Junction showed that in only a relatively few times did effective precipitation carry over from one day to the next.

With a storm thus defined, data for the two distributions were extracted from National Weather Service records. At least 15 years of data were used in all cases. Gamma probability distributions were selected as being able to best fit the data. For the interarrival time distribution, a shifted gamma distribution was used to obtain a better fit. The shift was one day since the probability of a one day interarrival time was a constant for all elevations, 0.41. The mean and the variance for each of the two distributions were determined from the data (see table A4-3).

The next step was to obtain a relationship between elevation and both the mean and variance for the two distributions. Regression analyses were made and in all four cases the model that gave the best fit was of the form $Y = b_0 + b_1 X + b_2 X^2$

in which X is elevation in thousands of feet and Y is either the mean or variance. In all instances, the correlation coefficient was greater than 0.95. Values for the coefficients in the above equation are shown in table A4-4 while figure A4-1 illustrates the relation between elevation and the means of the two distributions. Thus, for any elevation between 4,800 and 10,000 feet in the Grand Junction Resource Area, estimates can be made for the mean and variance of the two precipitation variables, precipitation depth and interarrival time. In

TABLE A4-1

CURVE NUMBERS AS A FUNCTION OF COVER DENSITY (CD) AND INFILTRATION RATE f (INCHES PER HOUR)

Vegetative Cover	Limits of application		Equation
	CD(%) a/	f(in/hr) b/	CN =
Juniper-Grass	none		92.4-4.8f-(0.25+0.08f)CD
Sage-Grass	none		96.0-10.5f-(0.49-0.035f)CD
Herbaceous	none		92.5-5.0f-(0.12-0.072f)CD
Oak-Aspen	none		83.4-4.25f-(0.39+0.055f)CD
Ponderosa Pine	>10%, <80%		90.0-8.0f-(0.02+0.13f)CD
Pasture or Rangeland	none	<2.13	92.06-4.26f-(0.11-0.08f)CD
	<50	>2.13	92.06-4.26f+(0.154-0.204f)CD
	>50	>2.13	113.91-14.55f-0.28CD
Annual Grass	none	<2.13	92.5-4.47f-(0.12+0.065f)CD
	<50	>2.13	95.37-5.82f+(0.019-131f)CD
	>50	>2.13	118.53-16.72f-(0.461-0.095f)CD
Forests	none	<1.13	89.0-8.24f-(0.20+0.02f)CD
	none	>1.13	102.41-14.55f-(0.20+0.02f)CD
Roads	CD=0	<2.13	92.0 - 4.24f
	CD=0	>2.13	98.45 - 7.27f

Source: Gifford, Hawkins, and Williams (1975).
a/ CD = cover density in percent.
b/ f = infiltration rate in inches per hour.

TABLE A4-2
COEFFICIENTS FOR RUNOFF CURVE NUMBER (Y) AS A FUNCTION OF PERCENT COVER (X), AND Y + a - bX FOR VARIOUS VEGETATIVE TYPES AND SOIL GROUPS

Vegetative Type	Soil Group	a	b	Notes
Juniper-Grass	C	88	0.32	1/
	B	82	0.42	1/
Sage-Grass	C	86.5	0.46	1/
	B	73.5	0.415	1/
Herbaceous	D	95	0.115	1/
	C	90	0.19	1/
	B	84	0.25	1/
Oak-Aspen	C	79	0.44	1/
	B	74	0.51	1/
Desert Brush	D	93	0.06	2/ 3/
	C	80	0.06	2/ 3/
	B	84	0.06	2/ 3/
Ponderosa Pine	C	83	0.14	2/ 4/
	B	73	0.31	2/ 4/
Pasture or Rangeland	A	77	0.56	3/
	A	63	0.28	6/
	B	83	0.28	
	C	89	0.18	
	D	91	0.13	5/
Annual Grass	A	75	0.44	3/
	A	60	0.13	6/
	B	83	0.26	
	C	89	0.08	
	D	91	0.13	7/
Forests (precipitation = 25 inches)	A	50.5	0.286	
	B	71.5	0.229	
	C	81.5	0.229	
	D	87	0.21	7/
Roads	A	73	0.00	
	B	83	0.00	
	C	88.5	0.00	
	D	90.5	0.00	7/
Bare Rock	(N.A.)	96	0.00	8/
Water Surfaces	(N.A.)	100	0.00	

Note: All above curve numbers for AMC II and I_a = 0.2S, cover without rocks. 1/ From Enderlin and Markowitz (1962). 2/ From Simanton, Renard, and Sutter (1973). 3/ For X<50 percent. 4/ For 10 percent X<80 percent. Nonlinear relationship to Y = 92 and Y = 83, respectively at X = 0. 5/ From NEH-4 (in table form); reduced and converted to above coefficients. 6/ For X>50 percent. Note similarity between annual grass and rangeland coefficients except for Soil Group "A." 7/ From unpublished tables from USFS personnel (personal communication). 8/ Assumes (Initial Abstraction) = 0.08 inch.

TABLE A4-3
STATISTICAL PARAMETERS OF PRECIPITATION CVARIABLES AT SELECTED ELEVATIONS

Station Elevation (Feet)	Precipitation Depth (Inches)		Interarrival Time (Days)	
	Mean	Variance	Mean	Variance
4855	0.127	0.029	7.77	59.00
5340	.153	.040	6.61	52.55
6180	.166	.043	6.53	47.97
9830	.315	.153	5.22	32.74

TABLE A4-4

VALUES FOR REGRESSION COEFFICIENTS IN EQUATIONS RELATING ELEVATION TO STATISTICAL PARAMETERS

Coefficient	Precipitation Depth (Inches)		Interarrival Time (Days)	
	Mean	Variance	Mean	Variance
b_0	0.0534	0.0996	15.43	123.07
b_1	.0057	-.0329	-2.21	-17.44
b_2	.0022	.0039	.12	.84

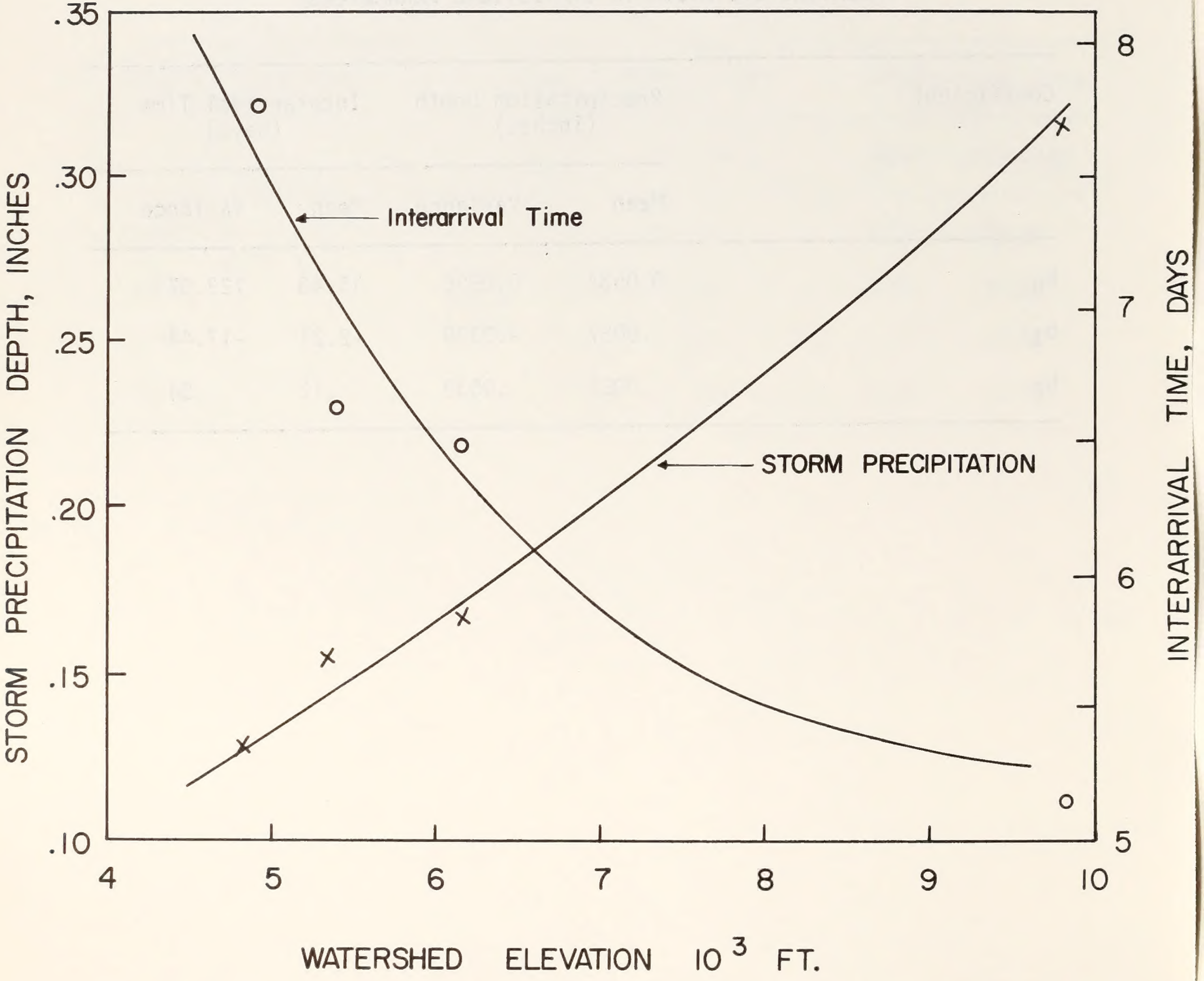


Figure A4-1. Effect of Elevation on Means of Storm Precipitation and Interarrival Time

turn, these estimates describe a particular gamma distribution $f(X) = \frac{\lambda(\lambda X)^{k-1} \; e^{-\lambda X}}{(k-1)}$ where $X = \text{mean}/\text{variance}$, $k = (\text{mean})^2/\text{variance}$

10. The SCS method was used for estimating runoff (Soil Conservation Service, 1972). Storm runoff resulting from rainfall is expressed as $V = \frac{(R-A)^2}{(R-A)+S}$ where V is runoff, R is storm precipitation as determined in step 9, S is the potential maximum retention, and A is the initial abstraction. All terms are expressed as depths, inches in this case. A runoff curve number (CN) is related to S by

$$CN = \frac{1000}{10+S} \quad \text{OR} \quad S = \frac{1{,}000}{CN} - 10$$

For this investigation A was assumed to be equal to 0.15 S rather than 0.2 S normally used by SCS. Studies in Arizona indicate that 0.15 is more representative of semiarid conditions than the 0.2 used for vegetation grown under more humid conditions (Fogel 1969).

Values for present and future curve numbers were determined by the Bureau of Land Management. It was assumed that these values were for the relatively dry antecedent moisture condition, AMC I. AMC II was assumed to be applicable when the previous 5-day rainfall ranged from 0.9 to 1.6 inches, with AMC III applying when the 5-day antecedent rainfall was in excess of 1.6 inches. These values are midway between the dormant and growing season values recommended by the SCS. The rationale behind this choice is simply that it is believed that soil moisture losses from the 5,000-to 8,000 - foot BLM watersheds may be less than at lower elevations. This would also be true for less dense vegetation, which is the existing situation, in comparison to the SCS values developed under more humid conditions. Thus, it was reasoned that for the BLM watersheds, lower antecedent precipitation should have a similar affect on runoff as the higher values used by the SCS. Given the curve number for condition I, CN_1, the curve numbers for conditions II and III, CN_3 and CN_3, are obtained from table A4-5 taken directly from the SCS handbook.

11. The peak discharge was estimated using the SCS equation as follows: $Q = \frac{484\ AV}{0.5D + 0.6T_c}$

where:

Q is the peak discharge in cfs,
A is watershed area in square miles,
V is runoff volume in inches,
D is duration of excess rainfall in hours, and
T_c is the time of concentration in hours.

D was assumed to be a constant equal to one hour. Inspection of the National Weather Service hourly precipitation data for Grand Junction indicated that a substantial part of what was deemed to be runoff - producing storms occurred in a one-or two-hour period. This, then, was assumed to be the time when runoff occurred, a period of relatively high intensity. Although fairly large rainfall amounts may be recorded for a 2-hour period, the time of maximum intensity would be somewhat less, and hence, the 1-hour duration of excess rainfall was assumed.

There are several methods for estimating the time of concentration, T_c, of a watershed. In this study, the upland method as presented by the SCS (Soil Conservation Service 1972) was used. The method estimates flow velocities for various channel slopes and overland flow or channel conditions (see figure A4-2). In most instances, the channel was assumed to be in the form of an upland gully.

In estimating storm sediment yield from a particular subarea within the watershed, an estimate of peak discharge as well as runoff volume is needed. Equation 5 was used, but (T_c) for a sub-area was estimated as a fraction of the total time based on the ratio of subarea to total area.

12. A modified form of the Universal Soil Loss Equation (Wischmeier and Smith 1965) was used to relate runoff variables and watershed parameters to storm sediment yield. Proposed by Williams and Berndt (1972), the equation is

$$Z = 95(LS)\ C\ K\ P\ (V \cdot Q)^{0.56}$$

where:

Z is the storm sediment yield in tons
LS is the slope length and gradient factor
C is the vegetal cover factor for undisturbed lands
K is the soil-erodibility factor
P is the erosion control practice factor
V is the volume of storm runoff in acre-feet
Q is the peak discharge in cubic feet per second.

Values for the topographic factor, LS, were obtained from table A4-6, which was derived from information in Wischmeier and Smith (1965). The LS factor consists of determining both the steepness and the length of the slope. Both of these values vary considerably in rough terrain even for a small subarea within the watershed. The use of average values has generally resulted in underestimating erosion losses. Wischmeier has recommended that the most severe value for the combination of length and gradient be used.

The vegetal factors were adapted from Wischmeier (1975), which uses cover density (CD) as a principal element in determining these values for a given type of vegetation (see table A4-7). Thus, the C-factor changes from the present to the future situation, the result of estimated changes in cover density.

The soil-erodibility factor K was difficult to quantify with the type of information that was available. Fortunately, this value does not change from the present to the future. It was decided to

TABLE A4-5

CURVE NUMBER AND CONSTRAINTS FOR THE CASE Ia = 0.25

1	2	3	4	5
CN for condition II	CN for conditions		S values*	Curve* starts where P =
	I	III		
			(inches)	(inches)
100	100	100	0	0
99	97	100	.101	.02
98	94	99	.204	.04
97	91	99	.309	.06
96	89	99	.417	.08
95	87	98	.526	.11
94	85	98	.638	.13
93	83	98	.753	.15
92	81	97	.870	.17
91	80	97	.989	.20
90	78	96	1.11	.22
89	76	96	1.24	.25
88	75	95	1.36	.27
87	73	95	1.49	.30
86	72	94	1.63	.33
85	70	94	1.76	.35
84	68	93	1.90	.38
83	67	93	2.05	.41
82	66	92	2.20	.44
31	64	92	2.34	.47
80	63	91	2.50	.50
79	62	91	2.66	.53
78	60	90	2.82	.56
77	59	89	2.99	.60
76	58	89	3.16	.63
75	57	88	3.33	.67
74	55	88	3.51	.70
73	54	87	3.70	.74
72	53	86	3.89	.78
71	52	86	4.08	.82
70	51	85	4.28	.86
69	50	84	4.49	.90
68	48	84	4.70	.94
67	47	83	4.92	.98
66	46	82	5.15	1.03
65	45	82	5.38	1.08
64	44	81	5.62	1.12
63	43	80	5.87	1.17
62	42	79	6.13	1.23
61	41	78	6.39	1.28
60	40	78	6.67	1.33
59	39	77	6.95	1.39
58	38	76	7.24	1.45
57	37	75	7.54	1.51
56	36	75	7.86	1.57
55	35	74	8.18	1.64
54	34	73	8.52	1.70
53	33	72	8.87	1.77
52	32	71	9.23	1.85
51	31	70	9.61	1.92
50	31	70	10.0	2.00
49	30	69	10.4	2.08
48	29	68	10.8	2.16
47	28	67	11.3	2.26
46	27	66	11.7	2.34
45	26	65	12.2	2.44
44	25	64	12.7	2.54
43	25	63	13.2	2.64
42	24	62	13.8	2.76
41	23	61	14.4	2.88
40	22	60	15.0	3.00
39	21	59	15.6	3.12
38	21	58	16.3	3.26
37	20	57	17.0	3.40
36	19	56	17.8	3.56
35	18	55	18.6	3.72
34	18	54	19.4	3.88
33	17	53	20.3	4.06
32	16	52	21.2	4.24
31	16	51	22.2	4.44
30	15	50	23.3	4.66
25	12	43	30.0	6.00
20	9	37	40.0	8.00
15	6	30	56.7	11.34
10	4	22	90.0	18.00
5	2	13	190.0	38.00
0	0	0	infinity	infinity

*For CN in column 1.

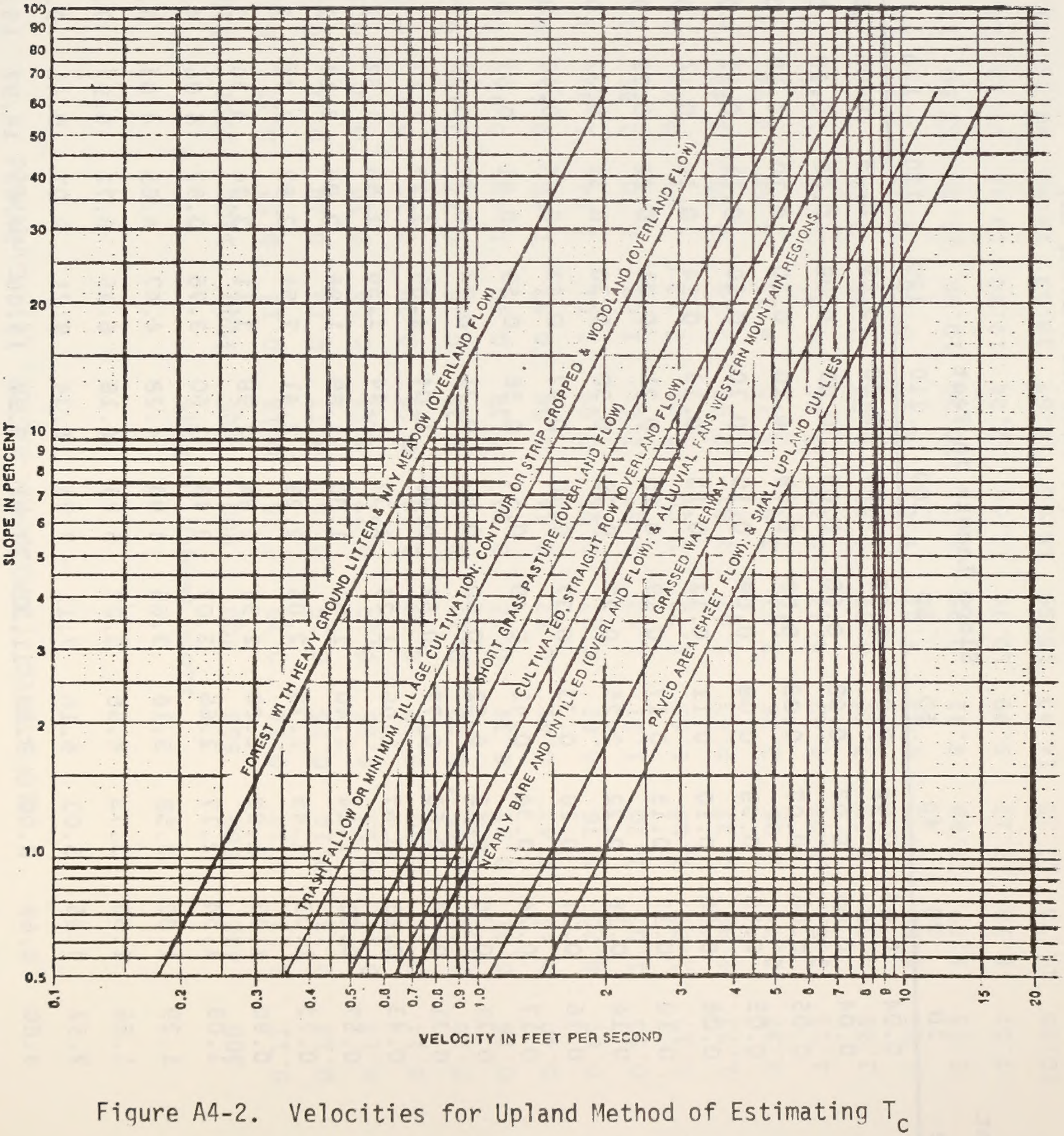


Figure A4-2. Velocities for Upland Method of Estimating T_c

TABLE A4-6

SLOPE-EFFECT (TOPOGRAPHIC FACTOR, LS)

Percent	Slope Length in Feet													
Slope	10	20	40	60	80	100	110	120	130	140	150	160	180	200
0.2	0.04	0.05	0.06	0.07	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.10	0.10
0.3	0.04	0.05	0.07	0.08	0.08	0.09	0.09	0.09	0.09	0.10	0.10	0.10	0.10	0.11
0.4	0.05	0.06	0.07	0.08	0.09	0.09	0.10	0.10	0.10	0.10	0.11	0.11	0.11	0.11
0.5	0.05	0.06	0.08	0.08	0.09	0.10	0.10	0.10	0.11	0.11	0.11	0.11	0.12	0.12
1.0	0.06	0.08	0.10	0.11	0.12	0.13	0.13	0.14	0.14	0.14	0.15	0.15	0.15	0.16
2.0	0.10	0.12	0.15	0.17	0.19	0.20	0.21	0.21	0.22	0.22	0.23	0.23	0.24	0.25
3.0	0.14	0.18	0.22	0.25	0.27	0.29	0.30	0.30	0.31	0.32	0.32	0.33	0.34	0.35
4.0	0.16	0.21	0.28	0.33	0.37	0.40	0.42	0.43	0.44	0.46	0.47	0.48	0.51	0.53
5.0	0.17	0.24	0.34	0.41	0.48	0.54	0.56	0.59	0.61	0.63	0.66	0.68	0.72	0.76
6.0	0.21	0.30	0.43	0.52	0.60	0.67	0.71	0.74	0.77	0.80	0.82	0.85	0.90	0.95
8.0	0.31	0.44	0.63	0.77	0.89	0.99	1.04	1.09	1.13	1.17	1.21	1.25	1.33	1.40
10.0	0.43	0.61	0.87	1.06	1.23	1.37	1.44	1.50	1.56	1.62	1.68	1.73	1.84	1.94
12.0	0.57	0.81	1.14	1.40	1.61	1.80	1.89	1.98	2.06	2.14	2.21	2.28	2.42	2.55
14.0	0.73	1.03	1.45	1.78	2.05	2.29	2.41	2.51	2.62	2.72	2.81	2.90	3.08	3.25
16.0	0.90	1.27	1.80	2.20	2.54	2.84	2.98	3.11	3.24	3.36	3.48	3.59	3.81	4.01
18.0	1.09	1.54	2.17	2.66	3.07	3.43	3.60	3.76	3.92	4.06	4.21	4.34	4.61	4.86
20.0	1.29	1.82	2.58	3.16	3.65	4.08	4.28	4.47	4.65	4.83	5.00	5.16	5.47	5.77
25.0	1.86	2.63	3.73	4.56	5.27	5.89	6.18	6.45	6.72	6.97	7.22	7.45	7.90	8.33
30.0	2.52	3.56	5.03	6.16	7.11	7.95	8.34	8.71	9.07	9.41	9.74	10.06	10.67	11.25
40.0	4.00	5.66	8.00	9.80	11.32	12.65	13.27	13.86	14.43	14.97	15.50	16.01	16.98	17.90
50.0	5.64	7.97	11.27	13.81	15.94	17.82	18.69	19.53	20.32	21.09	21.83	22.55	23.91	25.21
60.0	7.32	10.35	14.64	17.93	20.71	23.15	24.28	25.36	26.40	27.39	28.36	29.29	31.06	32.74

TABLE A4-6

SLOPE-EFFECT (TOPOGRAPHIC FACTOR, LS) Continued

Percent	Slope Length in Feet													
Slope	300	400	500	600	700	800	900	1000	1100	1200	1300	1500	1700	2000
0.2	0.11	0.12	0.13	0.14	0.15	0.15	0.16	0.16	0.17	0.17	0.18	0.19	0.19	0.20
0.3	0.12	0.13	0.14	0.15	0.16	0.16	0.17	0.18	0.18	0.18	0.19	0.20	0.21	0.22
0.4	0.13	0.14	0.15	0.16	0.17	0.17	0.18	0.19	0.19	0.20	0.20	0.21	0.22	0.23
0.5	0.14	0.15	0.16	0.17	0.18	0.18	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.24
1.0	0.18	0.20	0.21	0.22	0.23	0.24	0.25	0.26	0.27	0.27	0.28	0.29	0.30	0.32
2.0	0.28	0.31	0.33	0.34	0.36	0.38	0.39	0.40	0.41	0.42	0.43	0.45	0.47	0.49
3.0	0.40	0.44	0.47	0.49	0.52	0.54	0.56	0.57	0.59	0.61	0.62	0.65	0.67	0.71
4.0	0.62	0.70	0.76	0.82	0.87	0.92	0.96	1.01	1.04	1.08	1.12	1.18	1.24	1.33
5.0	0.93	1.07	1.20	1.31	1.42	1.52	1.61	1.69	1.78	1.86	1.93	2.07	2.21	2.40
6.0	1.17	1.35	1.50	1.65	1.78	1.90	2.02	2.13	2.23	2.33	2.43	2.61	2.77	3.01
8.0	1.72	1.98	2.22	2.43	2.62	2.81	2.98	3.14	3.29	3.44	3.58	3.84	4.09	4.44
10.0	2.37	2.74	3.06	3.36	3.62	3.87	4.11	4.33	4.54	4.74	4.94	5.30	5.65	6.13
12.0	3.13	3.61	4.04	4.42	4.77	5.10	5.41	5.71	5.99	6.25	6.51	6.99	7.44	8.07
14.0	3.98	4.59	5.13	5.62	6.07	6.49	6.88	7.26	7.61	7.95	8.27	8.89	9.46	10.26
16.0	4.92	5.68	6.35	6.95	7.51	8.03	8.52	8.98	9.42	9.83	10.24	11.00	11.71	12.70
18.0	5.95	6.87	7.68	8.41	9.09	9.71	10.30	10.86	11.39	11.90	12.38	13.30	14.16	15.36
20.0	7.07	8.16	9.12	9.99	10.79	11.54	12.24	12.90	13.53	14.13	14.71	15.80	16.82	18.24
25.0	10.20	11.78	13.17	14.43	15.59	16.66	17.67	18.63	19.54	20.41	21.24	22.82	24.29	26.35
30.0	13.78	15.91	17.79	19.48	21.04	22.50	23.86	25.15	26.38	27.55	28.68	30.81	32.80	35.57

TABLE A4-7

"C" VALUES FOR GRASSLAND, RANGELAND, WOODLAND, AND IDLE LAND

Vegetal Canopy	Percent Ground Cover					
	0	20	40	60	80	95-100
Grass	.26	.16	.11	.09	.03	.01
Brush	.34	.18	.13	.09	.04	.01
Mountain Shrub	.28	.17	.12	.08	.04	.003
Pinyon Juniper	.36	.20	.13	.06	.04	.003
Forest	.25	.14	.09	.06	.03	.003
Waste	.35	.24	.15	.09	.04	.01

SOURCE: Adapted from Wischmeir, W.H., Estimating the Soil Loss Equation's Cover and Management Factor for Undisturbed Areas. Agricultural Research Service, USDA, ARS - S - 40, 1975, pp. 118-124.

relate K to the hydrologic soil group classification used by the SCS. Based on SCS national and regional technical notes, estimated K-values that were used in this study were 0.20, and 0.35 and 0.30 for hydrologic soil groups B, C, and D respectively. Weighted means were calculated for each soil type.

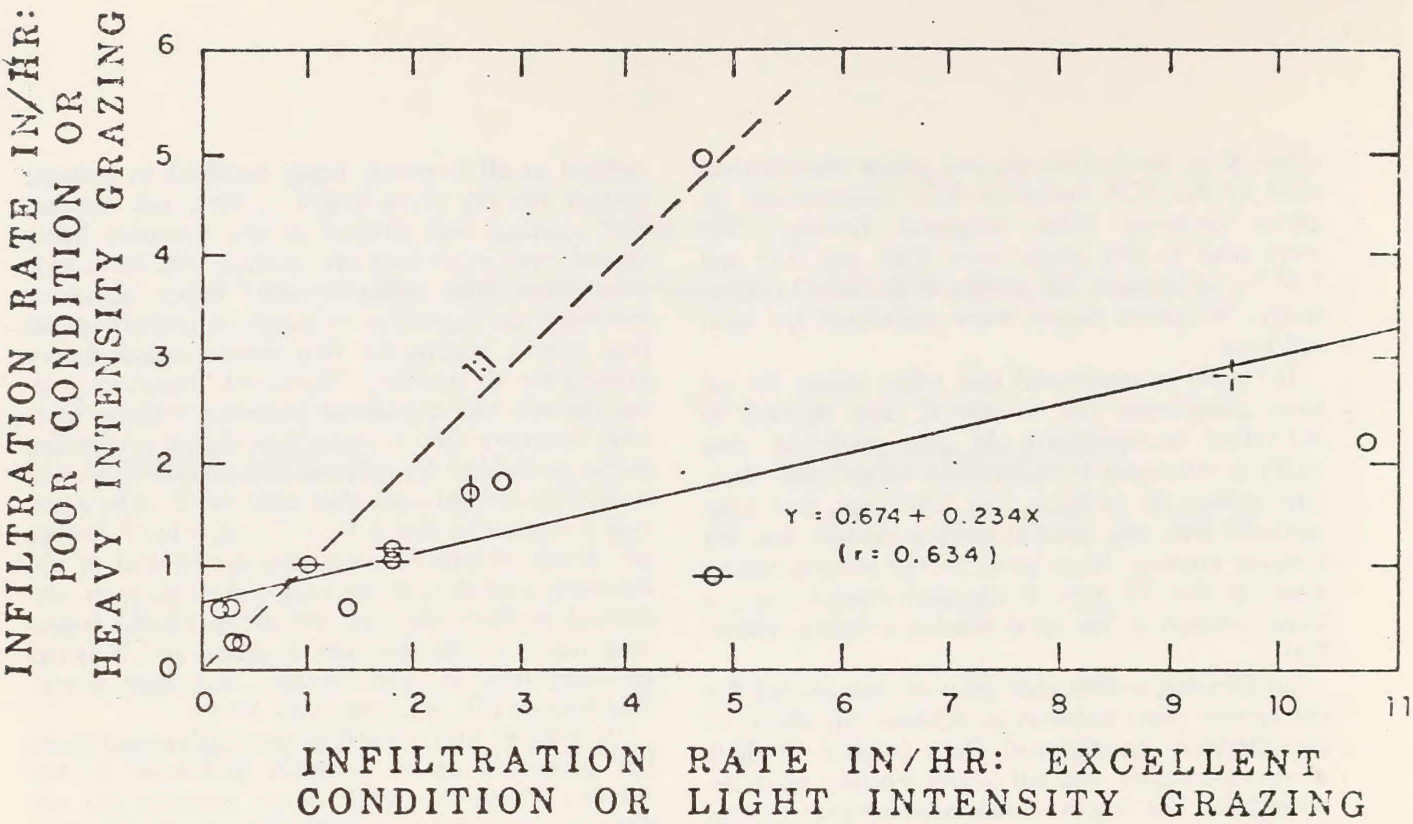
It should be mentioned that while values for the three parameters LS, C, and K may depend on individual interpretation, in this particular case BLM is interested in differences rather than absolute values. In addition, the Universal Soil Loss equation will only predict surface erosion and not channel erosion. Since most of the erosion taking place in the ES area is channel erosion, only a small fraction of the total erosion is being quantified.

13. Grazing within each pasture was plotted for the twenty years required to achieve full effects of the allotment management plans (AMPs). Periods of spring-summer and fall-winter grazing were recorded and the length of rest between grazing was also noted.

14. The infiltration rate at the end of the twenty-year period was calculated for each unit by applying the regression equation presented in figure A4-3. "Heavy" grazing, under a rotation scheme, was defined as all livestock being confined to a single pasture for any given length of time, and "moderate" grazing was defined as the livestock being spread over more than one pasture. All infiltration rates were fully affected under either heavy or moderate use regardless of length of grazing period (e.g., heavy grazing for two months equals heavy grazing for six months). "Recovery" between grazing periods was calculated assuming a linear four-year recovery time to some speculative pregrazing status, as defined by infiltration limits of respective hydrologic soil groups. (See table A4-8.) The equation to represent this is $F_r = F+(f_o - f)t/T$ (inches per hour), where F_r is the rate at the end of the recovery period, f_o is the pregrazing optimum rate defined by the hydrologic soil group, f is the beginning rate, t is the rest time in years, and T is the recovery time in years (in this case, four years). The limit of $t/T < 1$. (See table A4-8).

15. Future cover densities were calculated using the projected cover densities presented in the AMPs. Where the AMP cover densities did not coincide with Phase I data, the percent increase predicted in the AMP was applied to the cover densities used in step 5 above.

16. Future runoff and peak discharge estimates were made with the new infiltration rates and cover data as outlined in steps 5 through 12 above.



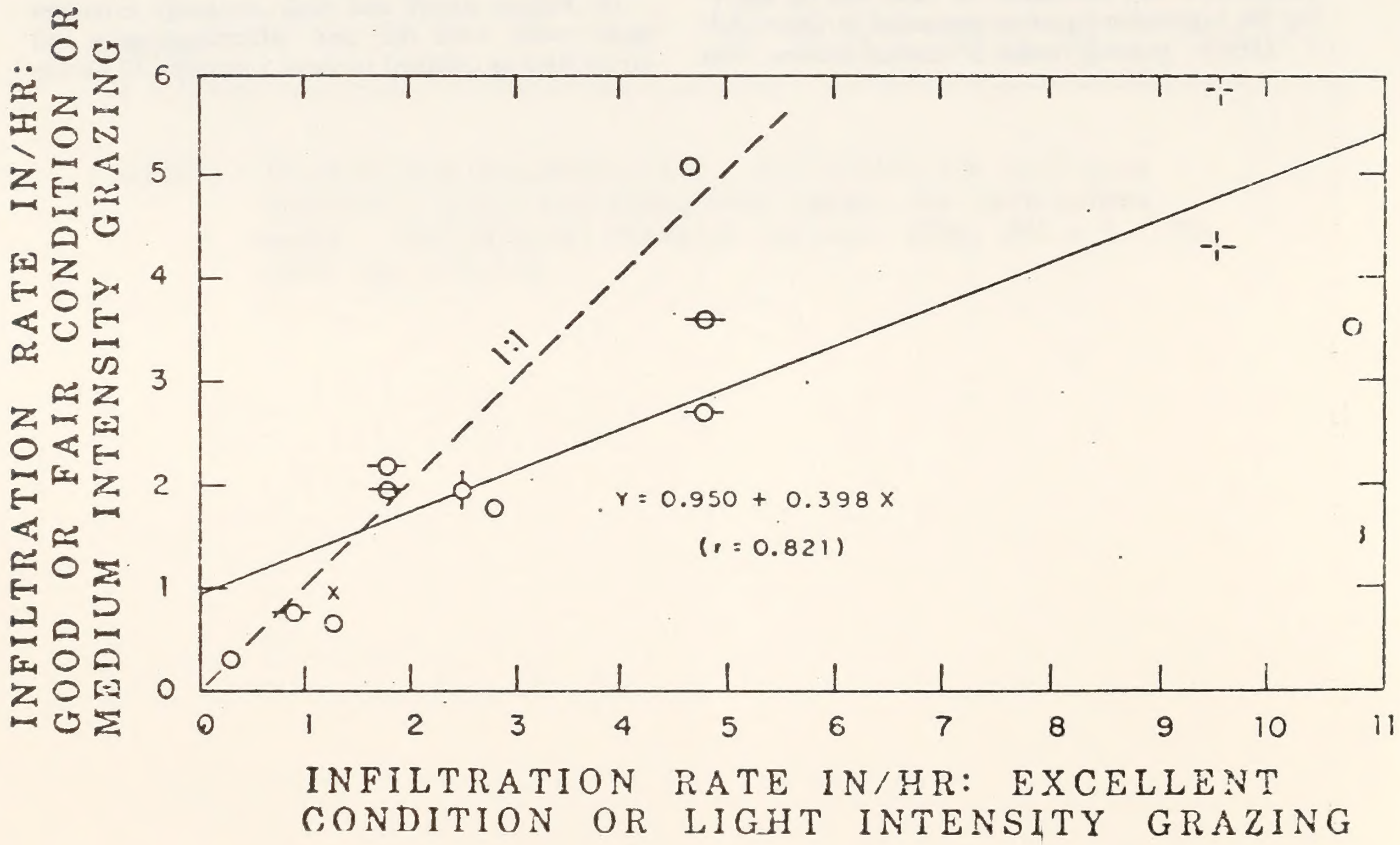


Figure A4-3. Changes in Infilitration Rates When Changing From Light to Moderate Grazing Intensities

SOURCE: Gifford et al. 1975.

TABLE A4-8

SAMPLE OUTPUT FOR REST ROTATION HYDROLOGIC IMPACT MODEL

From	To	Time (yr)	Activity	Infiltration Rate		
				Begin	End	
1 Jan	16 Jan	1.46	Rest	1.80	1.92	a/
16 Jun	15 Aug	0.17	Heavy Cattle	1.92	1.12	
15 Aug	15 Oct	0.17	Rest	1.12	1.17	
15 Oct	25 Jan	0.28	Moderate Sheep	1.17	1.17	
25 Jan	16 Aug	0.56	Rest	1.17	1.30	
16 Aug	15 Oct	0.17	Moderate Cattle	1.30	1.30	b/
15 Oct	1 Jan	0.20	Moderate Sheep			

a/ Hydrologic Soil Group "B"; present infiltration rate under moderate grazing 1.80 inches per hour = 0.950 + 0.398 (2.13). Infiltration rate for ungrazed "B" is 2.13 inches per hour. End infiltration rate (1.92 inches per hour) = (2.13-1.80) 1.46/4 + 1.80.

b/ Tandem cattle and sheep counts as a single grazing, in this case at "moderate" level.

APPENDIX 5

Appendix 5

DETERMINATION OF VISUAL RESOURCE MANAGEMENT (VRM) CLASSES AND VISUAL IMPACTS

Landscape Character

All landscapes have an identifiable character, regardless of size, location, or land use. This character is determined by the relationships between four basic elements: form, line, color, and texture. Form is the mass or shape of an object. Lines result from abrupt changes in form, color, or texture. Color is the visual perception distinguishing otherwise identical objects by detection of reflected light qualities. Texture is the result of the size, shape, uniformity, placement of parts, and the distance from which they are observed.

Each element exerts a visual influence on the observer. The more elements which exert a strong visual influence, the more interesting the landscape. The variety and harmony among these elements determines how visually pleasing a landscape is. General consensus is that landscapes with a high degree of visual variety are more desirable than those that tend toward monotony. The diverse elements of human backgrounds and emotions are not considered in assigning values to scenic quality, but are involved in weighing human sensitivity toward the quality.

The relationships of these four basic elements in the four landscape features -- soil, water, vegetation, and structures -- give the ES area a general landscape character of natural ruggedness, remoteness, and openness.

Visual Resource Management (VRM) Classes

Visual resource management (VRM) classes are based on scenic quality and visual sensitivity zones (BLM Manual 6300). Scenic quality is determined using a scenic quality evaluation sheet (figure A5-1). Scenery is rated either "A", outstanding; "B", characteristic; or "C" minimal.

Type A areas include Unaweep Canyon, the Dolores River Canyon from Salt Creek to Gateway, Little Dominguez Canyon, the Palisade, the cliffs on the north and east sides of Sinbad Valley, the rim and slopes of Grand Mesa, Chalk Mountain, the Book Cliffs, the Battlements, Vega Reservoir, Black Ridge to the Colorado River between Ruby Canyon and Westwater, and DeBeque Canyon.

Type C areas include the valley floor below the Book Cliffs and north of Highline Canal, Rabbit Valley and adjacent areas to the north and east, the mouth of Coal Canyon and adjacent areas to the north, Snyder Flat, the Bangs Canyon area, the McDonald Creek area, and the Hay Canyon area south of Douglas Pass. All other areas are rated type B.

Visual sensitivity zones are a combination of visual sensitivity and visual distance. Sensitivity is a measure of people's concern for the scenic quality of a given area. Sensitive areas (also referred to as critical view points) having high sensitivity include major highways, developed recreation sites, wildland areas, cultural sites on the National Register, and rivers qualifing for the Wild and Scenic Rivers System. Areas with moderate sensitivity include secondary roads with local or recreation use, sites and trails lightly used, and areas with a considerable amount of dispersed use.

Visual distance is categorized as follows:

1. Foreground: 0 to 0.5-1 mile
2. Middleground: 0.5-1 to 3-5 miles
3. Background: 3-5 to 15 miles
4. Seldom-seen: beyond 15 miles

Distance is important because the closer a feature is to the observer, the more distinguishable it becomes. However, the distance categories may be affected by land forms and vegetation obscuring or screening the view.

Once the visual sensitivity zone is determined by combining visual sensitivity and visual distance, it is then combined with the scenic quality rating to arrive at a VRM class (table A5-1).

These VRM classes describe the degree of modification allowed in the basic elements (form, line, color, and texture) of the landscape (see table A5-1). The classes are the basis for determining whether or not a proposed action would result in a visual impact and, if so, what mitigating measures would be required.

The degree of modification allowed for each class (i.e., the degree necessary before a significant impact is judged to have occurred) is as follows:

Figure A5-1

SCENIC QUALITY
INVENTORY AND EVALUATION CHART

key factors	rating criteria and score		
landform	High vertical relief as expressed in prominent cliffs, spires or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features dominant and exceptionally striking and intriguing such as glaciers. 5	Steep canyons, mesas, buttes, cinder cones and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features present and interesting though not dominant or exceptional. 3	Low, rolling hills, foothills or flat valley bottoms. Interesting detail landscape features few or lacking. 1
vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. 5	Some variety of vegetation, but only one or two major types. 3	Little or no variety or contrast in vegetation. 1
water	Clear and clean appearing, still, cascading white water, any of which are a dominant factor in the landscape. 5	Flowing, or still, but not dominant in the landscape. 3	Absent, or present, but not noticeable. 0
color	Rich color combinations, variety or vivid color; or pleasing contrasts in the soil, rock, vegetation, water or snow fields. 5	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. 3	Subtle color variations, contrast or interest; generally mute tones. 1
influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. 5	Adjacent scenery moderately enhances overall visual quality. 3	Adjacent scenery has little or no influence on overall visual quality. 0
scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc. 6	Distinctive, though somewhat similar to others within the region. 2	Interesting within its setting, but fairly common within the region. 1
cultural modifications	Free from aesthetically undesirable or discordant sights and influences; or modifications add favorably to visual variety. 2	Scenic quality is somewhat depreciated by inharmonious intrusions, but not so extensive that the scenic qualities are entirely negated or modifications add little or no visual variety to the area. 0	Modifications are so extensive that scenic qualities are for the most part nullified or substantially reduced. -4

SCENIC QUALITY

A= 19-33
B= 12-18
C= 0-11

TABLE A5-1

CRITERIA FOR DETERMINING VRM CLASSES AND MAXIMUM CONTRAST RATINGS

		Visual Sensitivity Zones		
		H	M	L
Special Areas (National Parklands, National Register sites)		I	I	I
Scenic	A	II	II	II
Quality	B	II	III	IV
	C	III	IV	IV
Highly Disturbed Areas		V	V	V

Class I: Changes are limited to natural ecological changes only. This class applies to primitive areas, some natural areas, and other situations where management activities are to be restricted.

Class II: Changes in any of the basic elements (form, line, color, or texture) caused by a management activity should not be evident in the characteristic landscape.

Class III: Changes in the basic elements (form, line, color, or texture) caused by a management activity may be evident in the characteristic landscape. However, the changes should remain subordinate to the visual strength of the existing character.

Class IV: Changes may subordinate the original composition and character but must reflect what could be a natural occurrence within the characteristic landscape.

Class V: Change is needed. This class applies to areas where the natural character has been disturbed to a point where rehabilitation is needed to bring it back into character with the surrounding countryside. This class would apply to areas where scenic quality has been reduced because of unacceptable intrusions. It is considered an interim, short-term classification used only until rehabilitation or enhancement is completed. The desired visual quality objective should be identified.

Regardless of the VRM class, the primary character of the landscape should be retained.

APPENDIX 6

Appendix 6

COMPLIANCE PROCEDURES FOR CULTURAL RESOURCES

In order to minimize any adverse impacts on cultural resources, BLM will specifically comply with the following regulations and procedures:

1.*Section 106* of the National Historic Preservation Act of 1966, which requires that any Federal agency having direct or indirect responsibility for, or jurisdiction over, any proposed Federal or federally assisted undertaking will afford the President's Advisory Council on Historic Preservation an opportunity to review and comment with regard to such undertaking, *if the undertaking has an impact upon a property included in the National Register of Historic Places.*

2.*Section 2(b)* of Executive Order 11593, which requires that all Federal agencies exercise caution to assure that cultural resources that might qualify for nomination to the National Register of Historic Places are not inadvertently transferred, sold, demolished, or substantially altered and that all Federal agencies will afford the President's Advisory Council an opportunity to review and comment with regard to any undertaking, *if such an undertaking has an impact upon a property eligible for inclusion in the National Register of Historic Places.* Eligibility is determined by the Secretary.

3.*Section 101(b) (4)* of NEPA, which declares that one objective of national environmental policy is to "preserve important historic, cultural, and natural aspects of our national heritage."

An inventory would be completed at each allotment improvement project that could cause adverse impacts to cultural resources. Findings would be evaluated and compliance procedures followed.

Implementation of compliance procedures would prevent or mitigate losses to archeological resources by ensuring that the resources are located and evaluated as a part of the BLM planning process prior to the initiation of any potentially damaging actions. It would also allow a determination of more suitable alternatives to avoid adverse impacts to cultural resources.

Specific mitigating actions would be developed in consultation with the Colorado Historic Preservation Officer and the Advisory Council on Historic Preservation in accordance with "Procedures for Protection of Historic and Cultural Properties" (36 CFR Part 800), pursuant to Section 106 of the National Historic Preservation Act of 1966 as amended September 28, 1976 (PL 94-422) and Executive Order 11593. Procedures established to implement Section 106 of the 1966 act (36 CFR Part 800) require that alternatives to avoid or mitigate adverse impacts on cultural resources be considered in project planning. Generally, this would require the following:

1. Inventory of affected area prior to disturbance
2. Evaluation of each cultural resource located for eligibility for inclusion in the National Register
3. In consultation with the State Historic Preservation Officer (SHPO), determination of the impacts of the proposed action on properties included in or eligible for inclusion in the National Register
4. Transmittal of findings of impacts to the Advisory Council on Historic Preservation for comment, with appropriate documentation, including comment of SHPO, depending on the type and extent of impacts
5. Avoidance or mitigation of impacts

The courses of action outlined above would allow BLM to avoid or mitigate impacts on cultural resources identified by archeological inventory. Should archeological materials be discovered during construction, the above-cited treatment of cultural resources would be implemented by BLM through clauses and stipulations in leases and contracts.

APPENDIX 7

TABLE A7-1

MAMMALS IN THE ES AREA

	Vegetation Types														
	Grassland	Meadow	Sagebrush	Mtn. Shrub	Conifer	Barren & Waste	PJ	Broadleaf	Saltbush	Greasewood	Desert Shrub	Annual	Cropland	Riparian	Aquatic
Order Marsupialia															
Family Didelphidae															
Opossum - Didelphis marsupialis virginiana intro. in Carpenter Wast, NW of G.J. in 1920. Still present.													R	R	
Order Insectivora															
Family Soricidae - shrews															
Masked Shrews - Sorex cinereus cinereus		C			C		C							C	
Wandering Shrew 1/ - Sorex vagrans obscurus	C	C		C	C		C							C	
Water Shrew - Sorex palustris navigator					C										C
Order Chirptera															
Family Vespertilionidae - Common Bats															
Little Brown Bat - Myotis lucifugus carissima					U		U							U	
Long-Eared Myotis - Myotis evotis evotis					C		C								
Long-Legged Myotis - Myotis volans interior				C	C		C								
California Myotis - Myotis californicus stephensi				U			U				U				
Small-Footed Myotis - Myotis leibii melanorhinus	C			C			C				C				
Western Pipistrelle - Pipistrellus hesperus hesperus						C	U		U	U	U				
Big Brown Bat - Eptesicus fuscus pallidus							C							C	
Hoary Bat - Lasiurus cinereus cinereus							C	C						C	
Townsend's Big-Eared Bat - Plecotus townsendi pallescens						U	U								
Pallid Bat - Antrozous pallidus pallidus						U	U				U				
Family Molossidae - Free-Tailed Bat															
Big Free-Tailed Bat - Tadarida macrotis						U									
Order Lagomorpha															
Family Ochotonidae - Pikas															
Pika - Ochotona princeps figginsi					C	C					C				
Family Leporidae - Rabbits and Hares															
Nuttall's Cottontail - Sylvilagus nuttallii pinetis				C	C		C								
Desert Cottontail - Sylvilagus audubonii warreni	Ab			Ab							Ab				
Snowshoe Hare - Lepus americanus bairdii				C	C										
White-Tailed Jackrabbit - Lepus townsendii townsendii	R		R	R	R		R								
Black-Tailed Jackrabbit - Lepus californicus texianus	R		R	R			R				R	R			
Order Rodentia															
Family Sciuridae															
Least Chipmunk - Eutamias minimus consobrinus			C	C	C		C								
Eutamias minimus operarius			C	C	C		C	C	C	C	C			C	
Colorado Chipmunk - Eutamias quadrivittatus hopiensis				C	C		C								
Yellow-Bellied Marmot - Marmota flaviventris luteola		C		C	C		C								
White-Tailed Antelope Squirrel - Ammospermophilus leucurus cinnamomeus															
Rock Squirrel - Spermophilus variegatus grammurus					U		R				C				
Golden-Mantled Ground Squirrel - Spermophilus lateralis lateralis							R						C	C	
White-Tailed Prairie Dog - Cynomys leucurus	C	C	Ab	Ab	Ab		Ab		C	C	C				
Abert's Squirrel 1/ - Sciurus aberti mimus		R	C		U				C	C					
Chickaree - Tamiasciurus hudsonicus fremonti					C										
Family Geomyidae - Pocket Gophers															
Valley Pocket Gopher - Thomomys bottae howelli	C	C	C	C										C	
Northern Pocket Gopher - Thomomys talpoides fossor	C	C	C						C	C	C			C	

TABLE A7-1

Continued

MAMMALS IN THE ES AREA

	Grassland	Meadow	Sagebrush	Mtn. Shrub	Conifer	Barren & Waste	PJ	Broadleaf	Saltbush	Greasewood	Desert Shrub	Annual	Cropland	Riparian	Aquatic
	Vegetation Types														
Family Heteromyidae - Pocket Mice & Kangaroo Rats															
Apache Pocket Mouse - Perognathus apache caryi	U	U					U								
Ord's Kangaroo Rat - Dipodomys ordii sanrafaeli	Ab	Ab	Ab					Ab	Ab	Ab	Ab	C		Ab	
Family Castoridae - Beaver															
Beaver - Castor canadensis concisor														C	C
Family Cricetidae															
Western Harvest Mouse - Reithrodontomys megalotis aztecus	Ab	Ab	Ab												
Canyon Mouse - Peromyscus crinitus auripectus				C		C	C						Ab	Ab	
Deer Mouse - Peromyscus maniculatus nebrascensis	Ab	Ab	Ab	Ab	Ab		Ab	Ab		Ab	Ab	Ab	Ab	Ab	
Peromyscus maniculatus rufinus	Ab	Ab	Ab	Ab	Ab		Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	
Brush Mouse - Peromyscus boylii rowlyi 1/				U											
Pinyon Mouse - Peromyscus truei truei			C	C			C								
Northern Grasshopper Mouse - Onychomys leucogaster pallescens	C		C	C			C					C	C		
White Throated Woodrat - Neotoma albigula brevicauda				C		C	C								
Desert Woodrat - Noetoma lepida sanrafaeli						R	R				R				
Mexican Woodrat - Neotoma mexicana inopinata			C	Ab	C		C		C_	C	C				
Bushy-Tailed Woodrat - Neotoma cineria. arizonae			C	C	C	C	C								
Grapper's Red-Backed Vole - Clethrionomys grapperi galei					C		C								
Heather Vole 2/ - Phenacomys intermedius intermedius					C										
Montane Vole - Microtus montanus fusus				Ab	Ab								Ab	Ab	
Long-Tailed Vole - Microtus longicaudus longicaudua			C		C									C	
Muskrat - Ondatra zibethicus osoyoosensis														Ab	Ab
Family Muridae															
House Mouse - Mus musculus													C	C	
Family Zapodidae															
Western Jumping Mouse - Zapus princeps princeps					C									C	
Family Erethizonthidae															
Porcupine - Erethizon dorsatum couesi Erethizon dorsatum epixanthum					C		C	C						C	
Order Carnivora															
Family Canidae - Dogs and Allies															
Coyote - Canis latrans lestes	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
Gray Wolf 3/ - Canis lupus youngi	Extinct														
Red Fox - Vulpes vulpes macroura		C			R,									C	
Kit Fox - Vulpes macrotis arsipus							U				U				
Gray Fox - Urocyon cinereoargenteus scotti	C		C	R	R		C		C	C	C				
Family Procyonidae - Raccoons and Allies															
Kingtail - Bassariscus astutus arizonensis				U			U								
Raccoon - Procyon lotor pallidus													C	C	
Family Urisidae - Bears															
Black Bear - Ursus americanus amblyceps				C	C									C	
Grizzly Bear 3/ - Ursus arctos	Extinct														
Family Mustelidae - Weasels and Allies															
Ermine - Mustela erminea muricus				U	U										
Long-Tailed Weasel - Mustela frenata nevadensis	C	C	C	C	C		C	C	R	R	R	R	C	C	
Black-Footed Ferret 4/ - Mustela nigripes	U	U	U												
Mink - Mustela vison energumenos														U	U
Badger - Taxidea taxus montana	R	R	R	R			R		R	R	R	R			

TABLE A7-1

Continued

MAMMALS IN THE ES AREA

	Vegetation Types														
	Grassland	Meadow	Sagebrush	Mtn. Shrub	Conifer	Barren & Waste	PJ	Broadleaf	Saltbush	Greasewood	Desert Shrub	Annual	Cropland	Riparian	Aquatic
Spotted Skunk - Spilogale putorius gracilis			C	C			C		C	C	C			C	
Striped Skunk - Mephitis mephitis estor	C	C	C	C	C		C	C	C	C	C	C	C	C	
River Ottor 3/ - Lutra canadensis														Reintroduced	
Family Felidae - Cats															
Mountain Lion - Felis concolor hippolestes				R	R		R							R	
Bobcat - Lynx rufus baileyi			C	C	C	C	C		R	C	C			C	
Order Artiodactyla															
Family Cervidae															
Elk - Cervus canadensis nelsoni	C		C	C	C		C	C	C	C	C	C	C	C	
Mule Deer - Edocioleus hemionus hemionus	C	C		C	C		C	C	C	C	C	C	C	C	
Family Antilocapridae															
Pronghorn - Antilocapra americana americana	C		C						C	C	C	C			
Family Bovidae															
Bison 3/ - Bison bison athabascae	Extinct in the unconfined state.														
Bighorn - Ovis canadensis canadensis		C	C	C	C										
Mouflon - O. musimon						U	U		U						

SOURCE: Armstrong 1972, Bissel 1978, Burt and Grossenheider 1964.

1/ Based on Whitewater Management Framework Plan.

2/ Trapping records (Armstrong 1972) indicate these animals occur on adjacent areas. However, it is likely that they do occur in the ES area.

3/ Formerly occurred.

4/ Potentially occurs.

NOTE: Ab = abundant, C = common, R = rare. and U = undetermined; underlining indicates breeding status. In some cases the designated numerical status applies only to a confined locality, e.g., Bighorns are only on Battlement Ridge. Underscored symbols indicated populations known to be breeding within vegetation type.

TABLE A7-2

BIRDS IN THE ES AREA

		Breeding	Migratory	Winter	Nesting Niche[3/]	Trophic Role[4/]
Common Loon - Gavia immer	(H)[1/] (A)[2/]		Aq U			Pi
Horned Grebe - Podiceps auritus	(H) (A)		Aq U-FC			Pi,In, molluscs
Eared Grebe - Podiceps caspicus	(H) (A)		Aq,R C-Ab			Pi,In, molluscs
Western Grebe - Aechmophorus occidentolis	(H) (A)		Aq FC			Pi,In, molluscs
Pied-Billed Grebe - Podilymbus podiceps	(H) (A)	Aq,R ↓ U	Aq,R ↓ U	Aq,R ↓ U	H	Pi (esp. crustacean) In, molluscs
Double-crested Cormorant Phalacrocorax auritus	(H) (A)		Aq, R ↓ S			Pi
Great Egret - Casmerodius albus	(H) (A)		Aq, R ↓ S (summer vagrant)			In,Pi
Great Blue Heron - Ardea herodius	(H) (A)	Aq,R FC		Aq,R U	W tops	Pi
Snowy Egret - Leucophoyx thula	(H) (A)	Aq,R ↓ FC	Aq,R FC		W,H	In,Pi
Black-crowned Night Heron - Nycticorax nycticorax	(H) (A)	Aq,R FC	Aq,R FC		W	In,Pi
American Bittern - Botaurus lentiginosus	(H) (A)	R ↓ S			H	Pi,In, Ca
White-faced Ibis - Plegadis chihi			Aq,Cr S			crustaceans molluscs worms
Whistling Swan - Olor columbianus	(H) (A)		Aq,R U			Hr esp. rootstocks
Canada Goose - Branta canadensis	(H)	Aq,R	Aq,R,Cr	Aq, R ↓	Mn,Ci	Hr,Gr, (esp.

TABLE A7-2 (Continued)

BIRDS IN THE ES AREA

		Breeding	Migratory	Winter	Nesting Niche[3/]	Trophic Role[4/]
	(A)	C	C	U	H	grasses)
White-fronted Goose - Anser albofrons	(H) (A)		Aq,R,Cr S-U			Hr,Gr
Snow Goose - Anser hyperborea	(H) (A)		Aq,R U			Hr,Gr esp. roots
Mallard - Anas platyrhynchos	(H) (A)	Aq,R,Cr C	Aq,R,Cr Ab	Aq,R↓,Cr C	H	Hr,Gr
Gadwall - Anas strepera	(H) (A)		Aq,R C			Hr,Gr
Pintail - Anas acuta	(H) (A)		Aq,R FC			Hr,Gr,In molluscs
Green-winged Teal - Anas carolinensis	(H) (A)	Aq,R U	Aq,R C	Aq,R↓ U	H	Hr,Gr,In, molluscs
Blue-winged Teal - Anas discors	(H) (A)		Aq,R FC			Hr,Gr,In, molluscs
Cinammon Teal - Anas cyanoptera	(H) (A)	Aq,R↓ U	Aq,R C		H	Hr,Gr,In, molluscs
American Widgeon - Anas americana	(H) (A)		Aq,R,Cr C	Aq,R↓ U		Hr,Gr
Shoveler - Anas clypeata	(H) (A)		Aq,R FC			Hr,Gr,In
Wood Duck - Aix sponsa	(H) (A)		Aq,R S			Hr,Gr
Redhead - Aythya americana	(H) (A)		Aq,R FC			Hr,In, molluscs
Ring-necked Duck - Aythya collaris	(H) (A)		Aq,R C			Hr,Gr,In, molluscs
Canvasback - Aythya valisineria	(H) (A)		Aq U	Aq U		Hr,In, molluscs
Lesser Scaup - Aythya affinis	(H) (A)		Aq C	Aq C		molluscs, Hr,Gr,In
Common Goldeneye - Bucephala clangula	(H) (A)		Aq C	Aq,R↓ C		In, molluscs Hr,Gr
Bufflehead - Bucephala albeola	(H) (A)		Aq,R U	Aq,R↓ S		In, molluscs

TABLE A7-2 (Continued)

BIRDS IN THE ES AREA

		Breeding	Migratory	Winter	Nesting Niche3/	Trophic Role4/
Ruddy Duck - Oxyura jamaicensis	(H) (A)		Aq C			Hr,Gr,In, molluscs
Hooded Merganser - Mergus cucullatus	(H) (A)			Aq U		Pi
Common Merganser - Mergus merganser	(H) (A)	Aq,R FC	Aq,R FC	Aq,R↓ C	Cl,Cr	Pi
Red-breasted Merganser - Mergus serrator	(H) (A)			Aq,R↓ U		Pi
Turkey Vulture - Cathartes aura	(H) (A)	R,Ba C	All types C		Cl	Ca scavenger
Goshawk - Accipiter gentilis	(H) (A)	Cf S		Cf S	W tall tree	
Sharp-shinned Hawk - Accipiter striatus	(H) (A)	Cf,R ,Sa S		Cr,R↓ FC	W	Ca esp. birds
Coopers Hawk - Accipiter cooperii	(H) (A)	Cf,R ,AS,MS,PJ U		R ,PJ FC	W	Ca up to cottontails
Red-tailed Hawk - Buteo jamaicensis	(H) (A)	all types w/ trees or cliffs C	all types C	Cr,R ,AS, C	Cl,W	Ca
Swainson's Hawk - Buteo swainsoni	(H) (A)	G,Cr,R,M,Sa,AS U	R,Cr,M,DS U		Cl,Mn,W	Ca
Rough-legged Hawk - Buteo lagopus	(H) (A)			Cr,G,M,DS U		Ca
Ferruginous Hawk - Buteo regalis	(H) (A)	Sa,Ba,Cr,M,G,S			Cl,W	Ca
Golden Eagle - Aquila chrysaetos	(H) (A)	all types w/ tree or cliffs FC		Cf,PJ,R↓,DS FC	Cl,W	Ca
Bald Eagle - Haliaeetus leucocephalus	(H) (A)			Aq,R↓ U-FC		Pi
Marsh Hawk - Circus cyaneus	(H) (A)	Cr,R,G,DS U	Cr,G,M,Aq,R,DS U	Cr,G,Aq,DS,R↓ FC	H	Ca, herpetiles
Osprey - Pandion haliaetus	(H) (A)		Aq,R U			Pi

TABLE A7-2 (Continued)

BIRDS IN THE ES AREA

		Breeding	Migratory	Winter	Nesting Niche3/	Trophic Role4/
Prairie Falcon - *Falco mexicanus*	(H) (A)	Cliffs in G,DS,PJ U-FC	all types U-FC	G,Cr,M,DS U-FC	Cl	Ca
Peregrine Falcon - *Falco peregrinus*	(H) (A)	Cliffs in PJ S(rare)	all types (rare)		Cl	Ca esp. birds
Merlin - *Falco columbarius*	(H) (A)			Cr,R↓,G,DS S		Ca,In esp. birds
American Kestrel - *Falco sparverius*	(H) (A)	all types w/ trees or cliffs C	Cr,R↓,MS,DS,G C	Cr,R↓,MS,DS, C	Cr	In,Ca
Blue Grouse - *Dendragapus obscurus*	(H) (A)	Cf,G FC		Cf FC	H	conifer needles, Hr,Fr
Sharp-tailed Grouse - *Pedioecetes phasianellus*	(H) (A)	Sa,MS,G,M U		Sa,MS,G,M U	H,L	Hr,buds, In,Fr
Sage Grouse - *Centrocercus urophasianus*	(H) (A)	Sa,G,MS U-FC		Sa,MS U-FC	Mn	leaves of sagebrush & others, Fr, In
Gambel's Quail - *Lophortyx gambelii*	(H) (A)	Sa,DS,R ,An FC		Sa,DS,R↓, FC	Mn,W	Gr,Fr,Hr
Ring-necked Pheasant - *Phasianus colchicus*	(H) (A)	Cr,R↓ FC		Cr,R FC	H	Gr,Fr,In
Chukar - *Alectoris graeca*	(H) (A)	An,Ba,DS,Cr U-FC	.	An,Ba,DS,Cr U-FC	Mn	Gr,Hr, (esp. cheatgrass)
Turkey - *Meleagris gallapavo*	(H) (A)	Cf,PJ U		Cf,PJ U	L	Gr (esp. acorns), Fr
Sandhill Crane - *Grus canadensis*	(H) (A)		Cr,Sa,R U-Ab			Fr,Gr,Hr, In
Virginia Rail - *Rallus limicola*	(H) (A)	R Und.	R Und.		H	In,Pi,Gr worms molluscs
Sora - *Porpana carolina*	(H) (A)	R FC			H	In,Gr,Hr, molluscs
American Coot - *Fulica americana*	(H) (A)	Aq,R Ab	Aq,R Ab	Aq,R FC	H	Om
Semipalmated Plover - *Charadrius semiplamatus*	(H)		Aq			In, worms,

Semipalmated Plover - Charadrius

TABLE A7-2 (Continued)

BIRDS IN THE ES AREA

		Breeding	Migratory	Winter	Nesting Niche3/	Trophic Role4/
	(A)		U (late Aug.)			molluscs
Killdeer - Charadrius vociferus	(H) (A)	G,Cr,Aq C	G,Cr,Aq C	Aq U	Mn	In, worms, molluscs
Black-bellied Plover - Squatarola squatarola	(H) (A)		Aq,Cr S			In, worms, molluscs
Common Snipe - Capella gallinago	(H) (A)		R,Aq FC			In, worms, molluscs, Gr
Long-Billed Curlew - Numenius americanus	(H) (A)	G Und.	G,R↓,Aq S		H,Mn	molluscs, worms In
Whimbrel - N. phaeopus	(H) (A)		Aq,R S			In,Pi, worms, molluscs
Spotted Sandpiper - Actitis macularia	(H) (A)	Aq C			H,L,Mn	In,Pi, worms
Solitary Sandpiper - Tringa solitaria	(H) (A)		Aq,R U-FC			In, worms, molluscs
Willet - Cataptrophorus semipalmatus	(H) (A)		Cr,Aq (Apr. 27) U-FC			In,Pi,Hr, worms, molluscs, Gr
Greater Yellowlegs - Totanus melanoleucus	(H) (A)		Aq C			In,Pi, worms molluscs
Lesser Yellowlegs - Tolanus flavipes	(H) (A)		Aq U			In, worms, molluscs
Pectoral Sandpiper - Erolia melanotus	(H) (A)		Aq U			In, worms, molluscs
Baird's Sandpiper - Erolia bairdii	(H) (A)		Aq C			In
Least Sandpiper - Erolia minutilla	(H) (A)		Aq C			In, worms, molluscs
Dunlin - Erolia alpina	(H) (A)		Aq S(fall)			In, worms, molluscs
Long-billed Dowitcher - Limnodromus scolopaceus	(H) (A)		Aq U-FC			In, worms, molluscs
Western Sandpiper - Ereunetes mauri	(H) (A)		Aq U-FC			In, molluscs
Marbled Godwit - Limosa fedoa	(H)		Aq			Gr,Fr,Hr,In,

TABLE A7-2 (Continued)

BIRDS IN THE ES AREA

		Breeding	Migratory	Winter	Nesting Niche3/	Trophic Role4/
	(A)		U			molluscs
American Avocet - Recurvirostra americanus	(H) (A)		Aq U			In,Gr, (esp. Potamogeton, molluscs
Black-necked Stilt - Himantopus mexicanus	(H) (A)		Aq,R↓ S			In, molluscs, Pi
Wilson's Phalarope - Steganopus tricolor	(H) (A)	Aq,R U	Aq,R C		H	In
Northern Phalarope - Lobipes lobatus	(H) (A)		Aq,R U			In
California Gull - Larus californicus	(H) (A)		Aq U			Om
Ring-billed Gull - Larus delawarensis	(H) (A)		Aq U			Om
Franklin's Gull - Larus pipixcan	(H) (A)		Aq U			In, some Gr, Hr, scavenger
Bonaparte's Gull - Larus philadelphia	(H) (A)		Aq,R S			In
Black Tern - Childonias niger	(H) (A)	R↓,Aq U	Aq,R U		H	In
Forster's Tern - Sterna forsteri	(H) (A)		Aq,R U			In,Pi
Band-tailed Pigeon - Columba fasciata	(H) (A)	Cf,MS U-FC	Cf,MS,Cr U-FC		W	Fr,Gr (esp. acorns)
Rock Dove - Columba livia	(H) (A)	Cr,Ba C		Cr C	Cl	Gr Ground foraging
Mourning Dove - Zenaidura macroura	(H) (A)	All types below Doug Fir Ab		R↓,Cr,DS S	H,W	Gr Ground foraging
Yellow-billed Cuckoo - Coccyzus americanus	(H) (A)	R U			W	In (esp. hairy caterpillar) foliage searching
Barn Owl - Tyto alba	(H) (A)	R↓,Cr,Ba Und		R↓,Cr Und	Cl,CV, inside buildings	Ca
Screech Owl - Otus asio	(H)	R		R↓	Cv	Ca,In

TABLE A7-2 (Continued)

BIRDS IN THE ES AREA

		Breeding	Migratory	Winter	Nesting Niche3/	Trophic Role4/
	(A)	U		U		
Flammulated Owl - Otus flammeolus	(H) (A)	Cf,AS Und.			Cv	In,Ca
Great Horned Owl - Bubo virginianus	(H) (A)	All types with trees or cliffs FC		All types FC	Cl,W	Ca
Pygmy Owl - Glaucidium gnoma	(H) (A)	Cf,AS U		Cf,R ,Cr U	Cv	In,Ca
Burrowing Owl - Spectyto cunicularia	(H) (A)	G,DS U	G,DS U		B	Ca
Long-eared Owl - Asio otus	(H) (A)	R↓,Sa,PJ U	R ,Sa,Cf U	R ,Cf U	Cl,W	Ca
Short-eared Owl - Asio flammeus	(H) (A)			G,R ,Cr U		Ca
Saw-whet Owl - Aegolius acadicus	(H) (A)	Cf Und		Cf,R Und	Cv	In,Ca
Poor-will - Phalaenoptilus nuttallii	(H) (A)	PJ,Cf,Sc,MS,DS C	R↓,PJ,Sa,MS,DS S		L,Mn	In aerial gatherer
Common Nighthawk - Chordeiles minor	(H) (A)	G,R,PJ C	GL,R↓,MS,Sa,DS,PJ AB		Mn	In aerial gatherer
White-throated Swift - Aeronautes saxatalis	(H) (A)	Ba C			Cl	In aerial gatherer
Vaux's Swift - Chasetura vauxi	(H) (A)	R↓ S			Cv	In aerial gatherer
Black-chinned Hummingbird - Archilochus alexandri	(H) (A)	PJ, R↓ C			W	Ne,In
Broad-tailed Hummingbird - Selasphorus platycercus	(H) (A)	Cf,M,R,MS C	all types FC		W	Ne,In
Rufous Hummingbird - Selasphorus rufus	(H) (A)		all types C			Ne,In
Calliope Hummingbird - Stellula calliope	(H) (A)		Cf,R↓ S			Ne,In
Belted Kingfisher - Megaceryle alcyon	(H) (A)	R FC	R FC	R↓ FC	B	Pi
Common Flicker - Colaptes auratus	(H)	All type except		All types except	Cv	Fr,In

TABLE A7-2 (Continued)

BIRDS IN THE ES AREA

		Breeding	Migratory	Winter	Nesting Niche3/	Trophic Role4/
	(A)	Ba C		Ba C		Ground foraging
Lewis Woodpecker - Asyndesmus lewis	(H) (A)	R↓,MS U	R U	R U	Cv	In,Fr
Yellow-bellied Sapsucker - Sphyrapicus varius	(H) (A)	As C			Cv	Wood, Sap, Fr,In, wood drilling
Williamson's Sapsucker - Sphyrapicus thyroideus	(H) (A)	Cf,AS C			Cv	Wood, Sap, In, wood drilling
Hairy Woodpecker - Dendrocopos villosus	(H) (A)	Cf,AS U-FC		Cf,AS,R U	Cv	In,Fr wood drilling
Downy Woodpecker - Dendrocopos pubescens	(H) (A)	Cf,AS,MS,R U		Cf,AS,MS,R U	Cv	In,Fr wood drilling
Northern 3-toed Woodpecker - Picoides tridactylus	(H) (A)	Cf S		Cf S	Cv	In wood drilling
Eastern Kingbird - Tyrannus tyrannus	(H) (A)	Cr,G,R↓ U			W	In,Fr aerial gatherer
Western Kingbird - Tyrannus verticalis	(H) (A)	Cr,R↓ C			W, utility poles	In aerial gatherer
Cassin's Kingbird - Tyrannus vociferans	(H) (A)	Cr,R ↑ U			W	In,Fr, aerial gatherer
Ash-throated Flycatcher - Myiarchus cinerascens	(H) (A)	PJ,R↓,Gr C			Cv	In,Fr, aerial gatherer
Say's Phoebe - Sayornis saya	(H) (A)	Cr,Gr,DS,Sa, C			Cl	In aerial gatherer
Willow Flycatcher - Empidonox traillii	(H) (A)	R U			W	In aerial gatherer
Hammond's Flycatcher - Empidonax oberholseri	(H) (A)	CF U			W(>15'up)	In aerial gatherer
Dusky flycatcher - Empidonax oberholseri	(H) (A)	MS,AS,R U			W	In aerial gatherer
Western Flycatcher - Empidonax difficilis	(H) (A)	Cf,AS,R↑ FC			L,W against tree trunk; where bark is split	In aerial gatherer
Western Wood Pewee - Contopus sordidulus	(H)	R,AS,MS,Cf			W(>20' high)	In

TABLE A7-2 (Continued)

BIRDS IN THE ES AREA

		Breeding	Migratory	Winter	Nesting Niche3/	Trophic Role4/
	(A)	C				aerial gatherer
Olive-sided Flycatcher - Nuttallornis boreclis	(H) (A)	CF U-FC			W high	In aerial gatherer
Horned Lark - Eremophila alpestris	(H) (A)	G,DS,Sa C		G,DS,Sa C-Ab	H,Mn	Gr,In
Violet Green Swallow - Tachycineta thalassina	(H) (A)	CF,AS,Ba C-Ab			Cv	In aerial gatherer
Tree Swallow - Iridoprocne bicolor	(H) (A)	CF,AS U	R↓,Aq C		Cv	In aerial gatherer
Bank Swallow - Riparia riparia	(H) (A)	Sand Banks U			B	In aerial gatherer
Rough-winged Swallow - Stelgidopteryx rufficollis	(H) (A)	Banks, Ag,R↓,Cr FC	Cr,R,Aq U		Cl stream side	In aerial gatherer
Barn Swallow - Hirundo rustica	(H) (AA)	Cr,Aq,R C	Cr,Aq,R C		Bd,Cl	In aerial gatherer
Cliff Swallow - Petrochelidon pyrrhonota	(H) (A)	Ba,Cr,Aq,R↓ C			Cl,Bd	In aerial gatherer
Gray Jay - Perisoreus canadensis	(H) (A)	Cf C		Cf C	W	
Steller's Jay - Cyanocitta stelleri	(H) (A)	CF C		CF C	W	In,Fr,Gr, Om
Scrub Jay - Aphelocoma coerulescens	(H) (A)	PJ,MS,R C		PJ,MS,R↓ C	Q	Gr, acorns Fr,Om
Pinon Jay - Gymnorhinus cyanocephala	(H) (A)	PJ C		PJ,R↓,G,MS C	W	pinyon nuts, Gr,Fr,In
Clark's Nutcracker - Nucifraga columbiana	(H) (A)	Cf C	C	Cf C	W	conifer seeds Gr,Fr,In Om
Black-billed Magpie - Pica pica	(H) (A)	G,Cr,R↓,CF,Sa C		G,Cr,R↓,Cf,Sa C	W	In,Gr,Fr, Om
Common Raven - Corvus corax	(H) (A)	Cf,Ba C		all types C	Cl,W	OM
Common Crow - Corvus brachyrhynchos	(H) (A)	Cr,R U-FC		CF,R↓,G,Cr U-FC	W	OM
Black-capped Chickadee - Parus atricapillus	(H)	Cf,AS		R↓,Sa,DS	Cv	In,Fr

TABLE A7-2 (Continued)

BIRDS IN THE ES AREA

		Breeding	Migratory	Winter	Nesting Niche[3/]	Trophic Role[4/]
	(A)	U		U		foliage searching
Mountain Chickadee - Parus gambeli	(H) (A)	Cf C		PJ,R↓ C	Cv	In,Fr foliage searching
Plain Titmouse - Parus inornatus	(H) (A)	PJ C		PJ C	Cv,Bd	In,Fr foliage searching
Common Bushtit - Psaltriparus minimus	(H) (A)	PJ,MS,Sa,R↓ FC		PJ,MS,Sa,R↓,DS FC	W	In, galls, foliage searching
White-breasted Nuthatch - Sitta carolinensis	(H) (A)	Cf,AS,R↓,PJ FC		Cf,AS,R↓,PJ FC	Cv	In,Gr,Fr, acorn, wood searching
Red-breasted Nuthatch - Sitta canadensis	(H) (A)	Cf U-FC		Cf,R↓ U	Cv	In,Gr,Fr, wood searching
Pygmy Nuthatch - Sitta pygmaea	(H) (A)	Cf C		Cf C	Cv	In,Gr,Fr, wood searching
Brown Creeper - Certhia familiaris	(H) (A)	Cf,R↓ U		Cf,R↓ U	W behind loose bark	In wood searching
Dipper - Cinclus mexicanus	(H) (A)	Aq C		Aq C	Cl streamside	In
House Wren - Troglodytes aedon	(H) (A)	Cf,AS, R C			Cv	In
Bewick's Wren - Thryomanes bewickii	(H) (A)	PJ,R↓ C		PJ,R↓ U	Cv	In
Long-billed Marsh Wren - Telmatodytes palustris	(H) (A)	R↓ S		R S	H	In
Canyon Wren - Catherpes mexicanus	(H) (A)	Cliffs U		Cliffs U	Cl	In
Rock Wren - Salpinetes obsoletus	(H) (A)	G,Ba C		G,Ba U	Cl	In
Mockingbird - Minus polyglottos	(H) (A)	Cr,R↓ ,MS,Sa,DS,PJ U		Cr,R↓,MS,Sa,DS,PJ	W	In,Fr
Gray Gatbird - Dumetella carolinensis	(H) (A)	R S			W	Fr,In

TABLE A7-2 (Continued)

BIRDS IN THE ES AREA

		Breeding	Migratory	Winter	Nesting Niche3/	Trophic Role4/
Sage Thrasher - Oreoscoptes montanus	(H) (A)	Sa U			H,W	In
Robin - Turdus migratorius	(H) (A)	Cr,AS,R,MS,Sa,CF Ab	all types Ab	Cr,R↓,MS,Sa	W	Fr,In,worms, snails, ground foraging
Hermit Thrush - Hylocichla guttata	(H) (A)	CF C			L,W	In,Fr ground foraging
Swainson's Thrush - Hylocichla ustulata	(H) (A)		R,AS,Cf FC			In,Fr ground foraging
Veery - Hylocichla fuscescens	(H) (A)	R↓ U			L brushy	In,Fr ground foraging
Western Bluebird - Siala mexicana	(H) (A)	CF,G U	Cf,G,AS,R C	Cf,MS,PJ,AS S	Cv	In,Fr ground foraging
Mountain Bluebird - Siala currucoides	(H) (A)	G,AS,R↓,Cf,PJ C	G,Cr C	PJ,Cr,G U	Cv	In ground foraging
Townsend's Solitaire - Myadestes townsendi	(H) (A)	Cf,AS U		Cf,R↓,PJ,Cr U	Cl,Cv,L	Fr,In
Blue-gray Gnatcatcher - Polioptila caerulea	(HO (A)	PJ,MS,Sa,R↓ C			W	In brush foraging
Golden-crowned Kinglet - Regulus satrapa	(H) (A)	Cf S	Cf U		W high	In foliage & wood searching
Ruby-crowned Kinglet - Regulus calendula	(H) (A)	Cf C	R,Cf C	R↓ S	W outer tips of branches	In foliage searching
Water Pipit - Anthus spinoletta	(H) (A)		Aq,R U			In,Gr ground searching
Bohemian Waxwing - Bombycilla garrula	(H) (A)			Cf,AS,R↓,Cr Irr.		Fr
Cedar Waxwing - Bombycilla cedrorum	(H) (A)	R U		R↓,Cr Irr.	W	Fr
Northern Shrike - Lanius excubitor	(H) (A)			Gr,M,Cr,R↓,Sa,MS C		In,Ca
Loggerhead Shrike - Lanius ludovicianus	(H) (A)	G,M,Cr,R ↓,MS,Sa,DS U		G,MS,Sa,DS C	W	In,Ca

TABLE A7-2 (Continued)

BIRDS IN THE ES AREA

		Breeding	Migratory	Winter	Nesting Niche3/	Trophic Role4/
Starling - *Sturnus vulgaris*	(H) (A)	Cr,R↓ Ab		Cr,R↓ Ab	Bd,Cv,B	In,Fr
Gray Vireo - *Vireo vicinior*	(H) (A)	PJ U			W	
Solitary Vireo - *Vireo solitarius*	(H) (A)	Cf,MS C			W	In foliage searching
Warbling Vireo - *Vireo giluus*	(H) (A)	AS,R↓ C			W	In foliage searching
Tennessee Warbler - *Vermivora peregrina*	(H) (A)		R↓ S			
Orange-crowned Warbler - *Vermivora celata*	(H) (A)	AS,R,MS,PJ U	AS,R,Cr,PJ,Cf U		H,W	In
Virginia's Warbler - *Vermivora virginiae*	(H) (A)	MS C			L	In foliage searching
Yellow Warbler - *Dendroica petechia*	(H) (A)	R C			W	In foliage searching
Yellow-rumped Warbler - *Dendroica coronata*	(H) (A)	Cf,AS,R FC	all types C		W	In foliage searching
Black-throated Gray Warbler - *Dendroica nigrescens*	(H) (A)	PJ C			W	In foliage searching
Townsend's Warbler - *Denroica townsendi*	(H) (A)		AS,R↓,Sa,Cf U			In foliage searching
MacGillivray's Warbler - *Oporornis tolmiei*	(H) (A)	R↑,MS Ū	R,MS,Cr C̄		H,W	In foliage & groun foraging
Yellowthroat - *Geothlypis trichas*	(H) (A)	R↓ U			H	In
Yellow-breasted Chat - *Icteria virens*	(H) (A)	R↓(shrubs) C	R↓ U		W	In,Fr brush foraging
Wilson's Warbler - *Wilsonia pusilla*	(H) (A)	R↑ Ū-C	R,MS F̄C		H,L,W	In foliage

TABLE A7-2 (Continued)

BIRDS IN THE ES AREA

		Breeding	Migratory	Winter	Nesting Niche3/	Trophic Role4/
						searching
House Sparrow - Passer domesticus	(H) (A)	Cr Ab		Cr Ab	Bd,Cv	Gr
Western Meadowlark - Sturnella neglecta	(H) (A)	G,Sa,Cr C		G,Cr FC	H	In,Gr
Yellow-headed Blackbird - Xanthocephalus xanthocephalus	(H) (A)	R↓ C			H	Gr,In
Red-winged Blackbird - Agelaius phoeniceus	(H) (A)	R C		R,G,Cr C	H	Gr,In
Northern Oriole - Icterus galbula	(H) (A)	R↓,Cr C			W	In, foliage searching
Brewer's Blackbird - Euphagus cyanocephalus	(H) (A)	R,Cr,G C		R,Cr C	W,H	Gr,In, ground foraging
Brown-headed Cowbird - Molothrus ater	(H) (A)	PJ,R,Cr,Cf,MS C			W parasitic	Gr,In, ground foraging
Western Tanager - Piranga ludoviciana	(H) (A)	R↓,Cf,MS C	R↓ C		W	In,Fr foliage searching
Rose-breasted Grosbeak - Pheucticus ludovicianus	(H) (A)		R↓,Cr S			Fr,Gr,In
Black-headed Grosbeak - Pheucticus melanocephalus	(H) (A)	R ,MS(all types w/tall broadleaf shrub) C			W	Gr,In,Fr ground foraging
Blue Grosbeak - Guiraca caerulea	(H) (A)	R↓ U			W	Gr,In
Lazuli Bunting - Passerina amoena	(H) (A)	R↓,MS,SA U			W	Gr,In
Evening Grosbeak - Hesperiphona vespertina	(H) (A)	Cf Irr.		Cr Irr.-Fc	W high	Fr,Gr,In
Cassin's Finch - Carpodacus cassinii	(H) (A)	Cf C			W	Fr,Fr, buds
House Finch - Carpodacus mexicanus	(H) (A)	Cr C			Bd,Cv,W	Gr

TABLE A7-2 (Continued)

BIRDS IN THE ES AREA

		Breeding	Migratory	Winter	Nesting Niche3/	Trophic Role4/
Pine Grosbeak - Pinicola enucleator	(H) (A)	Cf U		Cf U	W	Fr,Gr
Gray-crowned Rosy Finch - Leucosticte tephrocotis	(H) (A)			G,Cr, roadsides, Ba FC		Gr ground foraging
Black Rosy Finch - Leucosticte atrata	(H) (A)			Gr, Cr, roadsides, Ba U-FC		Gr ground foraging
Brown-capped Rosy Finch - Leucosticte australis	(H) (A)			Gr,Ba,Cr U		Gr ground foraging
Pine Siskin - Spinus pinus	(H) (A)	Cf,R↓ Irr.		R↓,Cr Irr.	W	Gr,In
American Goldfinch - Spinus tristis	(H) (A)	R↓ C		R↓,Cr,An C	W	Gr,In
Lesser Goldfinch - Spinus psaltria	(H) (A)	Cf,MS,R↓ U		Cr,R↓ rare	W	Gr
Red Crossbill - Loxia curvirostra	(H) (A)	Cf FC	Cf Irr.,FC	Cf Irr.,FC	W	Gr, conifer seeds
Green-tailed Towhee - Chlorura chlorura	(H) (A)	R,MS,Sa C		Cr,R↓ rare	H,W	Gr,Fr,In ground & brush foraging
Rufous-sided Towhee - Pipilo erythrophthalmus	(H) (A)	MS,R FC		R↓ U	L.W	Gr,Fr,In ground foraging
Lark Bunting - Calamospiza melanocorys	(H) (A)	G,M,DS U			Mn, with herb cover	In,Gr
Savannah Sparrow - Passerculus sandwichensis	(H) (A)	G,M,R↑ U	M,G U		H	Gr,In, snails, ground foraging
Vesper Sparrow - Pooecetes gramineus	(H) (A)	G,Cr,Sa U			H	Gr,In ground foraging
Lark Sparrow - Chondestes grammacus	(H) (A)	R↓,DS,Sa C			H,W	Gr,In ground foraging
Black-throated Sparrow - Amphispiza bilineata	(H) (A)	DS,PJ,Sa FC				
Sage Sparrow - Amphispiza belli	(H) (A)	Sa,DS U			W	Gr ground foraging
Dark-eyed Junco - Junco hyemalis	(H)			R↓,Cf,Sa		Gr

TABLE (Continued)

BIRDS IN THE ES AREA

		Breeding	Migratory	Winter	Nesting Niche3/	Trophic Role4/
	(A)			C-Ab		ground & brush foraging
Gray-headed Junco - *Junco caniceps*	(H) (A)	Cf FC-C		all types FC-C	h	Gr,In ground foraging
Tree Sparrow - *Spizella arborea*	(H) (A)			Cr,R↓,G,Sa U		Gr ground foraging
Chipping Sparrow - *Spizella passerina*	(H) (A)	R,Cf,PJ,MS C	all types C		W, esp. pines	In,Gr ground foraging
Brewer's Sparrow - *Spizella breweri*	(H) (A)	Sa C			H,W	In,Gr ground foraging
Harris' Sparrow - *Zonotrichia querula*	(H) (A)			R ,DS,Cr U-S		Gr
White-crowned Sparrow - *Zonotrichia leucophrys*	(H) (A)	MS,R↑ C		R↓ C	H,W	Gr,In ground foraging
White-throated Sparrow - *Z. albicollis*	(H) (A)			R↓ S		Gr ground foraging
Fox Sparrow - *Passerella iliaca*	(H) (A)	R↑ S			L,W	Gr,In ground foraging
Lincoln's sparrow - *Melospiza lincolniv*	(H) (A)	R↑,M U	R ,Cf U		H	In,Gr ground foraging
Song Sparrow - *Melospiza melodia*	(H) (A)	R C		R↓ C	W,H	Gr,In ground & brush foraging

SOURCES: Udvardy and Rayfield 1977, Martin et al. 1951, Bent 1926, Lowe et al. 1978, and Kingery and Graul 1978.

1/ Habitat is here equated with the vegetation types inhabited which are as follows:
An = Annuals
Aq = Aquatic (and bare shore)
AS = Aspen
Ba = Waste
Ba = Barren
Cf = Conifer (not PJ)
Cr = Cropland
DS = Desert Shrub
DS = Greasewood
Ds = Saltbush
G = Grassland
M = Meadow
MS = Mountain shrub

TABLE A7-2 (Continued)

BIRDS IN THE ES AREA

	Breeding	Migratory	Winter	Nesting Niche[3/]	Trophic Role[4/]

PJ = Pinyon-Juniper
R = Riparian (vegetated)
R↓ = Narrowleaf cottonwood/box elder zone and below
R↑ = above R
Sa = Sagebrush

2/ Abundance or frequency of occurrence as recorded by a typical observer in appropriate vegetation types and season:
Ab = Abundant = 25 or more usually seen in a day
C = Common = 5 or more usually seen in a day
FC = Fairly Common = one or more usually seen in a year (12 field days/season)
S = Scarce = reported almost every year ("Regular" or "Casual")
Irr. = Irregular = a vagrant whose abundance varies more or less unpredictably
Und. = Undetermined = number of observations believed not representative of species abundance

3/ Nesting niche:
B = burrows
Bd = buildings, bridges, barns, attics, and other man-made structures (other than utility poles)
Cl = cliffs (rock and dirt bank erosion cavities, ledges)
Cv = tree cavities
H = herbs (standing, matted on ground, or floating)
L = litter or duff layer on ground
Mn = mineral level, bare ground, or gravel
W = in woody plant structures (trees, shrubs)

4/ Trophic role:
Ca = carnivorous
Fr = frugivorous
Gr = granivorous
Hr = herbivorous
In = insectivorous (includes any arthropods other than large crustaceans)
Ne = nectarine
Om = omnivorous
Pi = picivorous (may include reptiles, amphibians, and crustaceans)

= more characteristic of the underscored than the other listed vegetation types

TABLE A7-3

REPTILES AND AMPHIBIANS IN THE ES AREA

		VEGETATION TYPES														
Class - Amphibia	Scientific Name	Grassland	Meadow	Sagebrush	Mtn. Shrub	Conifer	Barren & Waste	PJ	Broadleaf	Saltbush	Greasewood	Desert Shrub	Annuals	Cropland	Riparian	Aquatic
Order - Caudata																
Family - Ambystomidae																
Arizona Tiger Salamander	*Ambystoma tigrinum nebulosum*															B[1/]
Blotched Tiget Salamander	*Ambystoma tigrinum melanostictum*															B
Order - Salientia																
Family - Ranidae																
Bullfrog	*Rana catesbeiana*														NB[2/]	B
Leopard Frog	*Rana pipiens*														NB	B
Family - Hylidae																
Canyon Tree Frog	*Hyla arenicolor*															B
Boreal Chorus Frog	*Pseudacris triseriata maculata*	NB	NB	NB	NB	NB		NB		NB	NB	NB		NB	NB	B
Family - Pelobatidae																
Great Basin Spadefoot Toad	*Scaphiopus intermontanus*	NB		NB	NB			NB		NB	NB	NB				B
Family Bufonidae																
Boreal Toad	*Bufo boreas boreas*	NB	NB			NB									NB	B
Red Spotted Toad	*Bufo punctatus*							NB				NB		NB	NB	B
Rocky Mtn. Toad	*Bufo woodhousei woodhousei*	NB		NB	NB		NB	NB	NB	NB	NB	NB		NB	NB	B
Order - Squamata																
Family Iguanidae																
Yellowheaded Collared Lizard	*Crotaphytus collaris auriceps*[3/]		NB	B			B	B				B		NB		
Long-Nosed Leopard Lizard	*Gambelia wislizenii wislizenii*[1/]			B				B				B				
Northern Plateau Lizard	*Sceloporus undulatus elongatus*	NB		B		NB	B	B				B				
Northern Sagebrush Lizard	*Sceloporus graciosus graciosus*	B	NB	B	B		NB	NB		B	B	B		NB		
Northern Side-Blotched Lizard	*Uta stansburiana stansburiana*			B	N		B	B		B	B	B		NB		
Tree Lizard	*Urosaurus ornatus*			B	B		NB	B		B	B	B		NB		
Mountain Short-Horned Lizard	*Phrynosoma douglassi hernandesi*							B		NB						
Desert Short-Horned Lizard	*Phrynosoma douglassi ornatissimum*		B	B	B			B	B			B				
Family - Teiidae																
Plateau Whiptail Lizard	*Cnemidophorus velox*			B	B		B			B	B	B			B	
Northern Whiptail Lizard	*Cnemidophorus tigris septentrionalis*	NB		B			B	B				B		B		
Family - Colubridae																
Western Smooth Green Snake	*Opheodrys vernalis blanchardi*		B		B			B						NB	B	
Western Yellow-bellied Racer	*Coluber constrictor mormon*		B							B	B	B			B	
Desert Striped Whipsnake	*Masticophis taeniatus taeniatus*			B	B			B				B		B		
Great Plains Rat Snake	*Elaphe guttata emoryi*			B												
Great Basin Gopher Snake	*Pituophis melanoleucus deserticola*	NB		B	B			B		B	B	B			B	
Utah Milk Snake	*Lampropeltis triangulum taylori*	B	B	B	B	B		B		B	B	B	B	B	B	NB

TABLE A7-3 (Continued)

REPTILES AND AMPHIBIANS IN THE ES AREA

Class - Amphibia	Scientific Name	Grassland	Meadow	Sagebrush	Mtn. Shrub	Conifer	Barren & Waste	PJ	Broadleaf	Saltbush	Greasewood	Desert Shrub	Annuals	Cropland	Riparian	Aquatic
Wandering Garter Snake	Thamnophis elegans vagrans	NB	B		NB										B	NB
Western Black-Necked Garter Snake	Thamnophis crytopsis crytopsis					B		B								NB
Utah Black-Headed Snake	Tantilla planiceps utahensis							B								
Mesa Verde Night Snake	Hypsiglena torquata loreala								B	B	B					
Family - Viperidae																
Midget Faded Rattlesnake	Crotalus viridis concolor	B		B	B		B	B	B	B	B					
Prairie Rattlesnake	Crotalus viridis viridis	B		B	B	B	B	B	B	B	B					

SOURCE: Bernard and Brown 1977, Colorado Reptile and Amphibian Distribution Latilong Study (DOW) 1978, and professional experience.

NOTE: Unless otherwise noted, nomenclature follows Stebbins 1966.

[1] B = Breeding

[2] NB = Non Breeding or not known to be breeding.

[3] From Bernard and Brown 1977.

APPENDIX 8

TABLE A8-1

ESTIMATED FIRST YEAR INCREASES IN ONSITE EROSION AND POTENTIAL VEGETATION PRODUCTION LOSSES FROM PROPOSED RANGE FACILITIES

Allotment Name & No.	Acres Disturbed for Proposed Range Facilities	Present Onsite Erosion (T/Yr)	Estimated Future Onsite Erosion (T/Yr) with Proposed Range Facilities During First Year Following Construction	Net Change in Onsite Erosion (T/Yr) During First Year Following Construction	Potential First Year Vegetation Production Losses in AUMs[1]/	Long-term[2]/ Vegetation Losses in AUMs[1]/
Deferred Rotation						
Longshore (108)	4.60	0.4 - 1.3	1.4 - 5.4	1.0 - 4.1	4.17	0.42
Aubert Brother (128)	10.26	2.7 - 9.4	6.9 - 26.1	4.2 - 16.7	2.30	1.15
Colorado-Black Ridge (130)	5.00	2.4 - 8.8	4.7 - 17.6	2.3 - 8.8	1.12	0.90
Dugway (145)	6.30	0.5 - 1.8	2.0 - 7.4	1.5 - 5.6	1.41	0.15
Lost Canyon-Sugar Bench (154)	8.36	2.7 - 10.3	7.2 - 27.1	4.5 - 16.8	1.87	1.34
King (163)	10.47	1.0 - 3.8	4.1 - 15.5	3.1 - 11.7	2.34	0.45
Bulldraw Common (402)	1.00	0.2 - 0.9	0.9 - 3.5	0.7 - 2.6	0.22	0.18
Blue Mesa (406)	5.00	0.9 - 1.9	1.7 - 6.4	0.8 - 4.5	1.12	0.80
Sinbad Valley Common (409)	3.92	0.4	2.0	1.6	0.57	0.18
Ute Creek Common (410)	1.00	0.2 - 0.9	0.9 - 3.5	0.7 - 2.6	0.22	0.18
Hubbard (419)	1.00	0.2 - 0.7	0.9 - 3.5	0.7 - 2.8	0.22	0.18
Dolores Point (429)	2.00	0.4 - 1.5	1.9 - 7.0	1.5 - 5.5	0.45	0.36
Garr Mesa (503)	4.00	2.0 - 2.6	8.9 - 11.6	6.9 - 9.0	.91	0.73
Lapham Canyon Common (506)	0.50	<0.1 - 0.1	0.6 - 0.8	0.6 - 0.7	0.11	0.04
West Salt Common (603)	1.57	0.1 - 0.2	1.2 - 1.5	1.1 - 1.3	0.36	0.04
Baker-Bitter Creek (612)	1.00	1.1 - 1.4	2.2 - 2.9	1.1 - 1.5	0.39	0.31

TABLE A8-1 (Continued)

ESTIMATED FIRST YEAR INCREASES IN ONSITE EROSION AND POTENTIAL
VEGETATION PRODUCTION LOSSES FROM PROPOSED RANGE FACILITIES

Allotment Name & No.	Acres Disturbed for Proposed Range Facilities	Present Onsite Erosion (T/Yr)	Estimated Future Onsite Erosion (T/Yr) with Proposed Range Facilities During First Year Following Construction	Net Change in Onsite Erosion (T/Yr) During First Year Following Construction	Potential First Year Vegetation Production Losses in AUMs1/	Long-term2/ Vegetation Losses in AUMs1/
Prairie Cyn./Johns Cyn. (616)	1.50	0.7 - 0.9	2.9 - 3.7	2.2 - 2.8	1.27	0.27
Dry Fork (715)	1.36	0.5 - 0.6	2.5 - 3.2	2.0 - 2.6	0.31	0.19
Logan Gulch (733)	2.00	1.1 - 2.2	4.5 - 8.6	3.4 - 6.4	0.93	0.75
Wild Country Common (809)	0.50	0.1 - 0.2	0.6 - 0.8	0.5 - 0.6	0.11	0.04
Lyons-Anderson (811)	1.00	0.6 - 1.1	2.2 - 4.3	1.6 - 3.2	0.47	0.37
Big Park (843)	1.00	1.1 - 2.2	2.2 - 4.3	1.1 - 2.1	0.47	0.37
Rest Rotation						
Bangs Canyon ((116)	5.75	0.6 - 2.0	2.2 - 8.1	1.6 - 6.1	1.29	0.24
Thompson-Northeast Creek (148)	1.00	0.2 - 0.7	0.9 - 3.5	0.7 - 2.8	0.22	0.18
Kannah Creek Common (202)	10.18	0.8 - 2.5	3.3 - 10.1	2.5 - 7.6	3.96	0.44
Gibbler (301)	23.85	2.6 - 8.2	12.9 - 39.6	10.3 - 31.4	5.42	0.59
Wagon Park (302)	23.24	0.9 - 4.0	4.9 - 18.9	4.0 - 14.9	21.04	2.15
Palisade Flats (401)	4.63	0.8 - 2.7	3.3 - 12.5	2.5 - 9.8	1.04	0.44
Big Salt (501)	5.50	1.4 - 1.8	11.8 - 15.4	10.4 - 13.6	1.25	0.95
Coal Gulch-Roan Creek (502)	8.70	1.2 - 1.6	7.2 - 9.3	6.0 - 7.7	1.98	0.60
Little Salt (507)	12.10	2.2 - 3.5	9.0 - 14.2	6.8 - 10.7	3.05	0.31
Mt. Garfield (509)	9.08	4.3 - 6.7	17.2 - 27.0	12.9 - 20.3	2.29	0.23
Badger Wash (601)	2.42	0.9 - 1.4	6.8 - 10.8	5.9 - 9.4	0.61	0.40
East Salt (602)	16.94	4.5 - 6.2	21.6 = 30.1	17.1 - 23.9	8.39	0.84
Spears (703)	2.92	0.5 - 0.7	2.4 - 3.2	1.9 - 2.5	0.67	0.10
Brush Mtn. Common (705)	3.50	0.8 - 1.0	6.4 - 8.3	5.6 - 7.3	3.56	2.16
Rodeo Grounds (710)	8.00	4.1 - 5.3	17.9 - 23.2	13.8 - 17.9	1.82	1.46
Coon Hollow Common (712)	20.15	1.2 - 5.5	14.8 - 19.2	10.6 - 13.6	4.59	0.78

TABLE A8-1 (Continued)

ESTIMATED FIRST YEAR INCREASES IN ONSITE EROSION AND POTENTIAL VEGETATION PRODUCTION LOSSES FROM PROPOSED RANGE FACILITIES

Allotment Name & No.	Acres Disturbed for Proposed Range Facilities	Present Onsite Erosion (T/Yr)	Estimated Future Onsite Erosion (T/Yr) with Proposed Range Facilities During First Year Following Construction	Net Change in Onsite Erosion (T/Yr) During First Year Following Construction	Potential First Year Vegetation Production Losses in AUMs1/	Long-term2/ Vegetation Losses in AUMs1/
Henderson/4A Ridge (723)	2.00	0.5 - 0.6	2.6 - 3.3	2.1 - 2.7	2.03	0.71
Kimball Creek & Mtn. (722)	9.84	3.4 - 4.4	19.9 - 25.8	16.5 - 21.4	6.52	4.20
Round Mountain (745)	7.26	3.6 - 4.7	20.5 - 26.6	16.9 - 21.9	1.65	1.08
Best Pasture						
Rabbit Valley	2.00	0.9 - 3.5	1.9 - 7.0	1.0 - 3.5	0.45	0.36
Winter Flats (713)	21.81	7.3 - 15.4	34.3 - 66.3	27.0 - 50.9	10.15	3.46
TOTALS	274.21	65.0 -135.7	284.2-549.1	219.2-413.4	103.32	31.08

SOURCE: Soil Conservation Service.

NOTE: Table excludes disturbances from fences and cattleguards, which are negligible. Figures for vegetation production assume maximum site productivity. However, in most instances, the actual vegetation production losses would be somewhat less.

1/ One AUM equals 1,800 lbs. forage (air dried), based upon the "take half-leave half" rule.

2/ Long-term means from five years (the time required for revegetation) to the end of the life of the project.

TABLE A8-2

IMPORTANT SOIL MANAGEMENT INTERPRETATIONS

Soil Association	Soil Series	Seasonal High Water Table (feet)	Depth to Bedrock (inches)	Topsoil 1/	Roads 2/	Shallow Excavations 3/	Limiting Soil Factors Affecting Pond/Reservoir Locations 4/	Limiting Soil Factors Affecting Embankments 5/
50	Parachute	6+	20-40	Poor	Moderate-Severe	Severe	Depth to Rock, Slope, Seepage	Thin Layer
	Roan	---	---	---	---	---	---	---
	Northwater	6+	60+	Fair-Poor	Moderate-Severe	Severe	Slope	Low Strength
	Irigul	6+	10-20	Poor	Severe	Severe	Slope, Depth to Rock	Thin Layer, Piping
	Silas	4-6	60+	Good	Moderate	Moderate	Slope, Seepage	Low Strength, Piping
52	Pennisula	6+	60+	Poor	Severe	Severe	Slope	Compressible, Shrink-Swell, Low Strength
	Collbran	6+	60+	Fair-Poor	Severe	Severe	For 0-2% slope-Favorable, For 2+% slope-Slope	Shrink-Swell, Compressible
	Scholle	6+	60+	Poor	Moderate	Moderate	Seepage, Slope	Compressible, Low Strength, Piping
	Dominguez	6+	60+	Fair-Poor	Severe	Severe	For 0-2% slope-Favorable, For 2+% slope-Slope	Shrink-Swell, Hard to Pack, Compressible
53	Jerry	6+	60+	Fair-Poor	Severe	Moderate-Severe	Slope	Low Strength, Shrink-Swell, Hard to Pack
	Cochetopa	6+	60+	Poor	Severe	Severe	Slope	Large Stones, Shrink-Swell, Low Strength
	Scholle	6+	60+	Poor	Moderate	Moderate	Seepage, Slope	Compressible, Low Strength, Piping
58	Glenburg		60+	Good-Fair	Moderate-Severe	Moderate-Severe	Seepage	Piping, Erodes Easily
	Rock Outcrops	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated

TABLE A8-2 (Continued)

IMPORTANT SOIL MANAGEMENT INTERPRETATIONS

Soil Association	Soil Series	Seasonal High Water Table (feet)	Depth to Bedrock (inches)	Topsoil 1/	Roads 2/	Shallow Excavations 3/	Limiting Soil Factors Affecting Pond/Reservoir Locations 4/	Limiting Soil Factors Affecting Embankments 5/
91	Billings	---	60+	---	---	---	---	---
	Ravola	---	60+	---	---	---	---	---
92	Chipeta	---	10-20	---	---	---	---	---
	Persayo	6+	10-20	Poor	Severe	Moderate-Severe	Slope, Depth to Rock	Thin Layer, Compressible
	Fruita	6+	60+	Good-Fair	Moderate	Slight-Moderate	Slope, Seepage	Low Strength, Piping
	Billings	---	60+	---	---	---	---	---
	Badlands	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated
93	Fruita	6+	60+	Good-Fair	Moderate	Slight-Moderate	Slope, Seepage	Low Strength, Piping
	Avalon	---	60+	---	---	---	---	---
	Mock	6+	60+	Fair	Moderate	Slight-Moderate	Slope, Seepage	Piping, Low Strength
	Persayo	6+	10-20	Poor	Severe	Moderate-Severe	Slope, Depth to Rock	Thin Layer, Compressible
94	Mesa	6+	60+	Fair	Moderate	Moderate	Slope, Seepage	Favorable
	Redland	6+	60+	Good-Fair	Moderate	Slight-Moderate	Slope, Seepage	Low Strength, Piping, Hard to Pack
	Thoroughfare	6+	60+	Good	Moderate	Moderate	Slope, Seepage	Seepage, Piping, Low Strength
95	Utaline	6+	60+	Poor	Moderate-Severe	Severe	Slope, Seepage	Piping
	Nelman	6+	20-40	Fair-Poor	Moderate-Severe	Severe	Slope, Seepage	Piping, Thin Layer
	Lazear	6+	10-20	Poor	Severe	Severe	Depth to Rock, Slope	Thin Layer
	Blackston	6+	60+	Poor	Slight-Moderate	Severe	Slope, seepage	Seepage, Piping
	Avalon	---	60+	---	---	---	---	---
96	Palma	---	60+	---	---	---	---	---
	Potts	6+	60+	Fair-Poor	Moderate-Severe	Slight-Severe	Seepage	Low Strength, Piping
	Batterson	6+	10-20	Poor	Severe	Severe	Depth to Rock, Slope, Seepage	Thin Layer
	Loma	6+	60+	Fair	Severe	Moderate	Seepage, Slope	Compressible, Low Strength, Shrink-Swell
	Rock Outcrops	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated

TABLE A8-2 (Continued)

IMPORTANT SOIL MANAGEMENT INTERPRETATIONS

Soil Association	Soil Series	Seasonal High Water Table (feet)	Depth to Bedrock (inches)	Topsoil 1/	Roads 2/	Shallow Excavations 3/	Limiting Soil Factors Affecting Pond/Reservoir Locations 4/	Limiting Soil Factors Affecting Embankments 5/
97	Owen Creek	6+	20-40	Poor	Severe	Moderate-Severe	Slope, Depth to Rock	Thin Layer, Shrink-Swell, Low Strength
	Miracle	6+	20-40	Fair-Poor	Moderate-Severe	Severe	Depth to Rock, Slope	Thin Layer, Low Strength
	Skyway	6+	20-40	Good-Poor	Severe	Severe	Seepage, Slope, Depth to Rock	Thin Layer, Piping, Seepage
98A	Mayflower	6+	20-40	Fair	Severe	Severe	Depth to Rock, Slope	Compressible, Low Strength, Shrink-Swell
	Cebone	6+	20-40	Good-Poor	Severe	Severe	Depth to Rock, Slope	Compressible, Low Strength, Shrink-Swell
	Bangston	6+	60+	Fair-Poor	Slight-Severe	Severe	Seepage, Slope	Piping, Seepage
	Gateway	6+	20-40	Fair-Poor	Severe	Severe	Slope, Depth to Rock	Compressible, Shrink-Swell, Low Strength
98B	Bucklon	6+	10-20	Poor	Severe	Severe	Depth to Rock, Slope	Thin Layer, Shrink-Swell, Low Strength
	Inchau	6+	20-40	Poor	Moderate-Severe	Moderate-Severe	Slope, Depth to Rock, Seepage	Thin Layer
	Cochetopa	6+	60+	Poor	Severe	Severe	Slope	Large Stones, Shrink-Swell, Low Strength
	Jerry	6+	60+	Fair-Poor	Severe	Moderate-Severe	Slope	Low Strength, Shrink-Swell, Hard to Pack
	Dollard	6+	20-40	Poor	Severe	Severe	Slope, Depth to Rock	Shrink-Swell, Compressible, Low Strength
99	Veatch	6+	20-40	Poor	Moderate-Severe	Severe	Slope, Depth to Rock, Seepage	Thin Layer, Piping
	Castner	6+	6-20	Poor	Severe	Severe	Depth to Rock, Slope	Piping, Thin Layer
	Rock Outcrops	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated	Not rated
100	Arvada	---	60+	Poor	Severe	Moderate	Slope	Low Strength
	Haverson	6+	60+	Good-Fair	Moderate-Severe	Moderate-Severe	Seepage	Low Strength, Compressible, Piping
	Heldt	6+	60+	Poor	Severe	Severe	For 1-2% slope-Favorable,	Low Strength,

TABLE A8-2 (Continued)

IMPORTANT SOIL MANAGEMENT INTERPRETATIONS

Soil Association	Soil Series	Seasonal High Water Table (feet)	Depth to Bedrock (inches)	Topsoil 1/	Roads 2/	Shallow Excavations 3/	Limiting Soil Factors Affecting Pond/Reservoir Locations 4/	Limiting Soil Factors Affecting Embankments 5/
							For 2+% slope-Slope	Shrink-Swell
	Scholle	6+	60+	Poor	Moderate	Moderate	Seepage, Slope	Compressible, Low Strength, Piping
	Nihill	6+	60+	Poor	Moderate-Severe	Severe	Seepage, Slope	Hard to Pack, Piping
116	Parachute	6+	20-40	Poor	Moderate-Severe	Severe	Depth to Rock, Slope, Seepage	Thin Layer
	Roan	---	---	---	---	---	---	---
	Irigul	6+	10-20	Poor	Severe	Severe	Slope, Depth to Rock	Thin Layer, Piping
	Castner	6+	6-20	Poor	Severe	Severe	Depth to Rock, Slope	Piping, Thin Layer

SOURCE: Information on this table was taken from soil series "Form 5's", Soil Conservation Service.

1/ The term topsoil describes soil material used to redress barren surfaces, generally made barren by construction, to improve soil condition for re-establishment and maintenance of adapted vegetation. Topsoil is presumed to be fertile.

2/ Limitation ratings refer to the use of soils for construction and maintenance of roads. Factors affecting use include soil drainage, flooding, slope, depth to bedrock, shrink-swell potential, susceptibility to frost action, and stoniness and rockiness.

3/ Limitation ratings are based on the difficulty of removal and the caving hazard of the top five feet of the soil profile for the installation of gas, oil, and water pipelines.

4/ Limiting factors are based on the characteristics of undisturbed soils which affect their suitability for water impoundments. Soil factors affecting reservoir location include permeability, depth to horizon with permeability >2.0"/hour, bedrock, and cemented pan.

5/ Limiting factors are those which affect the use of soils for constructing compacted embankments (dams). Factors affecting use include soil material (sheer strength, compressiblity, permeability of compacted soil, susceptibility to piping, and compaction characteristics), shrink-swell potential, organic matter content, and coarse fragments over 6 inches in diameter.

NOTE:
Management interpretations are developed from soil properties to provide the resource manager with a management tool. These interpretations are made to determine the soil behavior in response to a specific treatment practice. The soil limitations are reflections of suitable land uses, given inherent soil properties, and are usually defined as slight, moderate, and severe.

1. Slight limitations - Soils relatively free of limitations that affect the intended use or management or with limitations that are easily overcome.
2. Moderate limitations - Soils with limitations imposed by topography, water table, soil texture, etc. Normally, these limitations can be overcome with proper planning, treatment, construction, and management.
3. Severe limitations - Soils with limitations imposed by steep topography, high water table, stream flooding, etc. More sophistication in planning, design, treatment, and management, and usually much higher costs, are associated with this category.

APPENDIX 9

TABLE A9-1

PRESENT AND PREDICTED VEGETATION TYPES AND CONDITION FOR AMPS (INTENSIVE)

ALLOTMENT NUMBER1	ALLOTMENT	VEGETATION TYPE	PRESENT RANGE CONDITION GOOD	PRESENT RANGE CONDITION FAIR	PRESENT RANGE CONDITION POOR	PREDICTED RANGE CONDITION GOOD	PREDICTED RANGE CONDITION FAIR	PREDICTED RANGE CONDITION POOR	TOTAL ACRES
Deferred Rotation									
103	Haystack								1352
		Mountain Shrub		1151		1151			
		Broadleaf Trees		136		136			
		Pinyon-Juniper		65		65			
105	South of the Road								1350
		Sagebrush		668		334	334		
		Pinyon-Juniper		662		331	331		
		Riparian			20		10	10	
106E	East Tom's Canyon								3788
		Grass	730			730			
		Sagebrush	114	95		209			
		Pinyon-Juniper	1109	1731		2840			
		Riparian	9			9			
108	Longshore								2285
		Sagebrush	45	379		424			
		Mountain Shrub		1072	95	1072	95		
		Pinyon-Juniper		391	160	391	160		
		Broadleaf Trees		69		69			
		Riparian		74		74			
113	Fessler								897
		Sagebrush		31		31			
		Mountain Shrub		174		174			
		Pinyon-Juniper		692		692			
115	Spring Creek								5547
		Grass	6	759	3	765	3		
		Meadow		527	105	527	105		
		Sagebrush	17	1148	246	1165	246		
		Mountain Shrub	142	98		240			
		Pinyon-Juniper	396	1910	190	2306	190		
125	Aubert Brothers								23058
		Grass	310	13		317	6		
		Sagebrush	415	32	944	431	488	472	

TABLE A9-1 (Continued)

PRESENT AND PREDICTED VEGETATION TYPES AND CONDITION FOR AMPS (INTENSIVE)

ALLOTMENT NUMBER1	ALLOTMENT	VEGETATION TYPE	PRESENT RANGE CONDITION GOOD	PRESENT RANGE CONDITION FAIR	PRESENT RANGE CONDITION POOR	PREDICTED RANGE CONDITION GOOD	PREDICTED RANGE CONDITION FAIR	PREDICTED RANGE CONDITION POOR	TOTAL ACRES
		Mountain Shrub	13	256	1710	141	983	855	
		Conifer			386		193	193	
		Waste		850		425	425		
		Pinyon-Juniper	1207	16331	525	9373	8428	262	
		Broadleaf Trees			31		15	16	
		Cropland	19			19			
		Riparian		16		8	8		
130	Colorado-Black Ridge								
		Grass		1409		705	704		16468
		Sagebrush		32		16	16		
		Pinyon-Juniper	1029	9107	4808	5583	6957	2404	
		Riparian		83		42	41		
133	Reservation								
		Grass			16		8	8	2744
		Sagebrush			1810		905	905	
		Pinyon-Juniper			918		459	459	
135	Knowles-Little Dolores Bench	Grass		102		51	51		6035
		Sagebrush			945		473	472	
		Pinyon-Juniper			4988		2494	2494	
137	Timber Ridge								
		Grass	502			502			2120
		Pinyon-Juniper	727		891	1618			
145*	Dugway								
		Sagebrush			40		20	20	9800
		Mountain Shrub		320	590	160	455	295	
		Waste		1070		535	535		
		Pinyon-Juniper		550	2940	275	1745	1470	
		Desert Shrub		2560	1500	1280	2030	750	
		Riparian		140	30	70	85	15	
		Cropland	60			60			
152	Round Knob								
		Pinyon-Juniper	540			540			3946
		Saltbush	3406			3406			
154*	Lost Canyon-Sugar Bench	Grass	239		156	239	78	78	32481
		Sagebrush	1376	584	4777	1668	2680	2389	
		Pinyon-Juniper	6843	1556	15196	7621	8376	7598	
		Desert Shrub		1663		332	831		
		Riparian			91		46	45	
161	Coates Creek								
		Pinyon-Juniper			226		113	113	357
		Sagebrush			131		66	65	

TABLE A9-1 (Continued)

PRESENT AND PREDICTED VEGETATION TYPES AND CONDITION FOR AMPS (INTENSIVE)

ALLOTMENT NUMBER1	ALLOTMENT	VEGETATION TYPE	PRESENT RANGE CONDITION GOOD	PRESENT RANGE CONDITION FAIR	PRESENT RANGE CONDITION POOR	PREDICTED RANGE CONDITION GOOD	PREDICTED RANGE CONDITION FAIR	PREDICTED RANGE CONDITION POOR	TOTAL ACRES
163R	King	Grass		1381		691	690		12234
		Sagebrush		1013	457	507	734	229	
		Mountain Shrub		480	2625	240	1552	1313	
		Waste		343		171	172		
		Pinyon-Juniper		843	5092	421	2968	2546	
203	Whitewater Common	Grass		1203	53	602	628	26	22300
		Sagebrush		802		401	401		
		Pinyon-Juniper		6988		6988			
		Saltbush		8155	4798	4078	6476	2399	
		Greasewood		116	175	58	146	87	
		Riparian		10		5	5		
304	Woodring	Mountain Shrub		132		66	66		1167
		Pinyon-Juniper		1027	8	514	517	4	
402	Bulldraw Common	Pinyon-Juniper		4828		2414	2414		5084
		Desert Shrub			256		128	128	
405	Wright Draw	Sagebrush		12	115	6	64	57	3525
		Pinyon-Juniper		2606	168	1303	1387	84	
		Broadleaf Trees		5	7	3	6	3	
		Desert Shrub		243	21	122	132	10	
		Riparian		5	3	3	4	1	
		Annuals			136		68	68	
		Waste		204		102	102		
406	Blue Mesa	Pinyon-Juniper			34346		17173	17173	41943
		Sagebrush			3097		1549	1548	
		Waste			1632		816	816	
		Barren			2868		1434	1434	
407	Bull Hill-Maverick	Pinyon-Juniper		12881		12881			14600
		Mountain Shrub			1360		1360		
		Sagebrush			359		359		
409	Sinbad Valley	Pinyon-Juniper		1581	2508	791	2044	1254	10298
		Sagebrush		747	1128	374	937	564	
		Waste		4334		2167	2167		
410	Ute Creek	Pinyon-Juniper			6695		3348	3347	6908
		Desert Shrub		213		107	106		

TABLE A9-1 (Continued)

PRESENT AND PREDICTED VEGETATION TYPES AND CONDITION FOR AMPS (INTENSIVE)

ALLOTMENT NUMBER1	ALLOTMENT	VEGETATION TYPE	PRESENT RANGE CONDITION			PREDICTED RANGE CONDITION			TOTAL ACRES
			GOOD	FAIR	POOR	GOOD	FAIR	POOR	
411	Dolores River								
		Sagebrush		10	203	5	107	101	3359
		Pinyon-Juniper		20	1349	10	685	674	
		Waste		110	443	55	277	221	
		Greasewood		130	264	65	197	132	
		Desert Shrub		20	700	10	360	350	
		Broadleaf Trees		10	70	5	40	35	
		Cropland			30		15	15	
416	North Creek								
		Waste		714		357	357		4155
		Mountain Shrub	132	53		159	26		
		Pinyon-Juniper		2016	1059	1008	1538	529	
		Sagebrush		16	33	8	25	16	
		Greasewood			52		26	26	
		Broadleaf Trees			35		18	17	
		Conifer		25	20	12	23	10	
419	Hubbard								
		Pinyon-Juniper			11239		5620	5619	27411
		Waste			11968		5984	5984	
		Sagebrush		849	173	425	511	86	
		Saltbush			1115		558	557	
		Cropland			77		39	38	
		Riparian			20		10	10	
		Mountain Shrub		1279		640	639		
		Grass			119		60	59	
		Conifer		572		286	286		
420	GML								3251
		Riparian			18		9	9	
		Sagebrush			1235		618	617	
		Pinyon-Juniper			1998		999	999	
424	Bergis North Mesa								
		Sagebrush	428			428			1783
		Mountain Shrub	867			867			
		Pinyon-Juniper	488			488			
429	Dolores Point								
		Sagebrush		730		365	365		7510
		Pinyon-Juniper			6223		3112	3111	
		Waste		557		278	279		
433	Hamilton								
		Saltbush			235		118	117	
		Pinyon-Juniper			929		465	464	1174
		Riparian		10		5	5		
502R	Coal Gulch/Roan Crk.								
		Sagebrush		275	556	275	556		16611
		Waste		1856			1856		

TABLE A9-1 (Continued)

PRESENT AND PREDICTED VEGETATION TYPES AND CONDITION FOR AMPS (INTENSIVE)

ALLOTMENT NUMBER[1]	ALLOTMENT	VEGETATION TYPE	PRESENT RANGE CONDITION			PREDICTED RANGE CONDITION			TOTAL ACRES
			GOOD	FAIR	POOR	GOOD	FAIR	POOR	
		Pinyon-Juniper		13924		9120	4804		
503	Garr Mesa								
		Saltbush			7062		3531	3531	
		Greasewood			1442		721	721	31421
		Pinyon-Juniper		4886	5300	2443	5093	2650	
		Mountain Shrub		5434	1337	2717	3386	668	
		Waste		403		202	201		
		Sagebrush		635	2059	318	1347	1029	
		Riparian			128		64	64	
		Conifer		1793		897	896		
		Grass		141	281	71	211	140	
		Broadleaf Trees		520		260	260		
505	Buniger								
		Pinyon-Juniper		1226		1226			1388
		Sagebrush		56	106	56	106		
506	Lapham Canyon Common								
		Mountain Shrub		2029	510	2029	510		4953
		Conifer		1281	40	1281	40		
		Sagebrush		359	26	359	26		
		Pinyon-Juniper		645	63	645	63		
508	Mogensen								
		Saltbush			1234		1234		1537
		Greasewood			303		303		
603	West Salt Common								
		Saltbush		10796	1281	5398	6039	640	70271
		Greasewood		414	2042	207	1228	1021	
		Riparian		13	283	7	148	141	
		Sagebrush		1485	618	743	1051	309	
		Mountain Shrub	2546	15619	142	10356	7880	71	
		Conifer	460	1609		1265	804		
		Waste		841	64	421	452	32	
		Pinyon-Juniper	932	29674	1125	15769	15400	562	
		Broadleaf Trees	314	13		321	6		
604	Crow Bottom								
		Pinyon-Juniper		1691		846	845		3736
		Saltbush		1564	274	782	919	137	
		Riparian		32	175	16	104	87	
612	Baker-Bitter Creek								
		Saltbush		620		310	310		14954
		Sagebrush	5920	170	132	6005	151		
		Desert Shrub	1970	1670	2700	2805	2185	1366	
		Riparian	722			122			
		Grass	1050			1050			
616	Prairie Canyon-Johns								

TABLE A9-1 (Continued)

PRESENT AND PREDICTED VEGETATION TYPES AND CONDITION FOR AMPS (INTENSIVE)

ALLOTMENT NUMBER1	ALLOTMENT	VEGETATION TYPE	PRESENT RANGE CONDITION			PREDICTED RANGE CONDITION			TOTAL ACRES
			GOOD	FAIR	POOR	GOOD	FAIR	POOR	
	Canyon	Pinyon-Juniper	5711	4588		10299			23705
		Greasewood			120		120		
		Sagebrush			578		578		
		Waste			410		410		
		Mountain Shrub	10942	1356		12298			
702	Berry Homestead								
		Saltbush			2220		1110	1110	2985
		Pinyon-Juniper			358		179	179	
		Waste			407		204	203	
705	Brush Mountain Common								
		Sagebrush	1509	14		1523			2278
		Conifer	320	16		336			
		Waste		79		79			
		Broadleaf Trees	278	14		292			
		Riparian	48			48			
706	Burdick E. of Ranch/Tater Hills	Pinyon-Juniper		1611	55	1611	55		2996
		Sagebrush		802	137	802	137		
		Mountain Shrub	74	27		101			
		Waste			290		290		
714	Doughtery Gulch								
		Grass		21		21			5644
		Mountain Shrub		2465		2465			
		Conifer		3158		3158			
715	Dry Fork								
		Pinyon-Juniper		1617	3327	809	2472	1663	10497
		Mountain Shrub		3352		1676	1676		
		Sagebrush		389	302	195	345	151	
		Conifer	1435			1435			
		Broadleaf Trees	12	4		14	2		
		Riparian	39			39			
		Grass	20			20			
721	Head of Carr Creek								
		Grass			330		330		5804
		Mountain Shrub		2463	1101	2463	1101		
		Conifer		954	103	954	103		
		Waste		392		392			
		Broadleaf Trees		160	7	160	7		
		Riparian	22		294	22	294		
732	Logan End Common								
		Mountain Shrub	853	254		1107			1841
		Broadleaf Trees	378	72		450			
		Sagebrush	172	30		202			
		Conifer	82			82			

TABLE A9-1 (Continued)

PRESENT AND PREDICTED VEGETATION TYPES AND CONDITION FOR AMPS (INTENSIVE)

ALLOTMENT NUMBER1	ALLOTMENT	VEGETATION TYPE	PRESENT RANGE CONDITION GOOD	PRESENT RANGE CONDITION FAIR	PRESENT RANGE CONDITION POOR	PREDICTED RANGE CONDITION GOOD	PREDICTED RANGE CONDITION FAIR	PREDICTED RANGE CONDITION POOR	TOTAL ACRES
733	Logan Gulch								
		Sagebrush		2626		1313	1313		3927
		Pinyon-Juniper		1301		651	650		
742	Paddock								
		Riparian			19		19		1700
		Mountain Shrub		1254		1254			
		Pinyon-Juniper		48	7	48	7		
		Grass			4		4		
		Conifer	368			368			
748	Upper Brush Mountain								
		Sagebrush		754		754			950
		Conifer		96		96			
		Broadleaf Trees		100		100			
754	Whittaker Flats								
		Sagebrush	1178			1178			3270
		Waste		395		395			
		Pinyon-Juniper	1590			1590			
		Riparian		107		107			
755	4A Individual								
		Sagebrush		110		110			310
		Broadleaf Trees		12		12			
		Mountain Shrub		61		61			
		Pinyon-Juniper		127		127			
807	Spring Creek to Coon Creek								
		Sagebrush		275	210	275	210		4730
		Mountain Shrub		1300	606	1300	606		
		Pinyon-Juniper		893	1401	893	1401		
		Riparian		19	26	19	26		
808	White Mountain Common								
		Sagebrush		244		122	122		2932
		Mountain Shrub		1517		759	758		
		Pinyon-Juniper		1164		582	582		
		Cropland		7		4	3		
809	Wild Country Common								
		Waste		1319		660	659		7974
		Sagebrush		556		278	278		
		Pinyon-Juniper		6047		3024	3023		
		Barren		52		26	26		
811	Lyons-Anderson								
		Sagebrush			804		804		2326
		Pinyon-Juniper			1522		1522		
835	Lower Rapid								
		Pinyon-Juniper		2797			218	217	5785

TABLE A9-1 (Continued)

PRESENT AND PREDICTED VEGETATION TYPES AND CONDITION FOR AMPS (INTENSIVE)

ALLOTMENT NUMBER1	ALLOTMENT	VEGETATION TYPE	PRESENT RANGE CONDITION GOOD	PRESENT RANGE CONDITION FAIR	PRESENT RANGE CONDITION POOR	PREDICTED RANGE CONDITION GOOD	PREDICTED RANGE CONDITION FAIR	PREDICTED RANGE CONDITION POOR	TOTAL ACRES
		Mountain Shrub	1111			1399	1398		
		Sagebrush		1877		1111			
						939	938		
843	Big Park								
		Waste			2208		1104	1104	11610
		Barren			180		90	90	
		Pinyon-Juniper			7528		3764	3764	
		Sagebrush			1259		630	629	
		Grass			435		218	217	
847	Jerry Gulch								
		Sagebrush	204	50	227	229	139	113	1771
		Pinyon-Juniper	98	227	951	212	589	475	
		Grass	14			14			
TOTALS			61518	256626	208691	222105	207539	97192	526836
Rest Rotation									
101E	Fish Park								
		Grass	883	1648		2531			3863
		Sagebrush	36	466		502			
		Waste		70		70			
		Pinyon-Juniper	239	521		760			
116	Bangs Canyon								
		Sagebrush	4115		1093	4115	547	546	40661
		Mountain Shrub	1499			1499			
		Conifer	551			551			
		Waste		384		192	192		
		Pinyon-Juniper	31000		697	31000	349	348	
		Saltbush			1286		643	643	
		Riparian			36		18	18	
140	Three Canyons								
		Sagebrush		1038		1038			10132
		Pinyon-Juniper		8024		8024			
		Desert Shrub		1030		1030			
		Riparian		40		40			
148	Thompson-Northeast Creek								
		Sagebrush	100	32		132			8532
		Mountain Shrub	555	55		610			
		Pinyon-Juniper		7790		7790			
150	Meinhart								
		Grass		33		33			2190

TABLE A9-1 (Continued)

PRESENT AND PREDICTED VEGETATION TYPES AND CONDITION FOR AMPS (INTENSIVE)

ALLOTMENT NUMBER1	ALLOTMENT	VEGETATION TYPE	PRESENT RANGE CONDITION GOOD	PRESENT RANGE CONDITION FAIR	PRESENT RANGE CONDITION POOR	PREDICTED RANGE CONDITION GOOD	PREDICTED RANGE CONDITION FAIR	PREDICTED RANGE CONDITION POOR	TOTAL ACRES
		Sagebrush		760		760			
		Mountain Shrub		872		872			
		Pinyon-Juniper		513		513			
		Riparian		12		12			
157	Boulder Canyon-Ladder Canyon	Sagebrush		292		292			5313
		Mountain Shrub		38		38			
		Pinyon-Juniper		2617	1711	2617	1711		
		Desert Shrub			655		655		
163D	King	Grass	154			154			1058
		Sagebrush	718			718			
		Mountain Shrub	11			11			
		Pinyon-Juniper	170			170			
		Riparian	5			5			
201	Davis	Pinyon-Juniper		2120		2120			6150
		Saltbush			4030		4030		
202	Kannah Creek Common	Grass		1000		1000			29710
		Waste		380		380			
		Pinyon-Juniper		9980	670	9980	670		
		Saltbush		11950	4090	11950	4090		
		Greasewood		710	660	710	660		
		Annuals		270		270			
301	Gibbler Common	Riparian		293	231	293	231		45012
		Saltbush		3534	1389	3534	1389		
		Pinyon-Juniper		7469	26405	7469	26405		
		Waste			1056		1056		
		Sagebrush		2559	1251	2559	1251		
		Grass		262		262			
		Barren		563		563			
302E	Wagon Park Common	Pinyon-Juniper	6431		18982	6431	9491	9491	31385
		Waste		4807		2404	2403		
		Riparian		90	371	45	231	185	
		Mountain Shrub		58	563	29	311	281	
		Conifer	83			83			
401	Palisade Flats	Pinyon-Juniper		3031		3031			8780
		Saltbush			987		987		
		Desert Shrub		3294		3294			
		Waste		1468		1468			

TABLE A9-1 (Continued)

PRESENT AND PREDICTED VEGETATION TYPES AND CONDITION FOR AMPS (INTENSIVE)

ALLOTMENT NUMBER1	ALLOTMENT	VEGETATION TYPE	PRESENT RANGE CONDITION GOOD	PRESENT RANGE CONDITION FAIR	PRESENT RANGE CONDITION POOR	PREDICTED RANGE CONDITION GOOD	PREDICTED RANGE CONDITION FAIR	PREDICTED RANGE CONDITION POOR	TOTAL ACRES
501E	Big Salt								
		Sagebrush		519	71	260	295	35	25888
		Mountain Shrub		6249		3125	3124		
		Conifer		914		457	457		
		Pinyon-Juniper		11801	167	5901	5984	83	
		Saltbush		4100	864	2050	2482	432	
		Greasewood		466	677	233	572	338	
		Riparian			60		30	30	
502D	Coal Gulch-Roan Creek								
		Sagebrush	1177	355		1532			8264
		Mountain Shrub		5275		5275			
		Conifer		1457		1457			
504	Hunter Wash								
		Sagebrush	60	3190		1655	1595		16032
		Pinyon-Juniper	680	952		1156	476		
		Annuals	60	2760		1440	1380		
		Saltbush	100	5759		2980	2879		
		Greasewood		1290		645	645		
		Grass		1181		591	590		
507	Little Salt								
		Pinyon-Juniper			7827		3914	3913	32732
		Sagebrush			4456		2228	2228	
		Greasewood			2366		1183	1183	
		Saltbush			9452		4726	4726	
		Grass			8631		4316	4315	
509E	Mt. Garfield Common								
		Waste		2911		1456	1455		27250
		Pinyon-Juniper		172		86	86		
		Saltbush		480	21542	240	11011	10771	
		Annuals		128	936	64	532	468	
		Greasewood			1081		541	540	
601	Badger Wash								
		Sagebrush		95	204	95	204		8059
		Saltbush		2312	4021	2312	4021		
		Greasewood		802	625	802	625		
602E	East Salt								
		Grass	4340	1256		4968	628		94387
		Sagebrush	4808	157	3267	4888	1711	1633	
		Mountain Shrub	20634		562	20634	281	281	
		Conifer	6384			6384			
		Pinyon-Juniper	32027	1284	2110	32669	1697	1055	
		Broadleaf Trees	93			93			
		Saltbush	9398	1367	4886	10081	3118	2434	
		Greasewood	109	50	1231	134	641	615	
		Riparian			442		221	221	

TABLE A9-1 (Continued)

PRESENT AND PREDICTED VEGETATION TYPES AND CONDITION FOR AMPS (INTENSIVE)

ALLOTMENT NUMBER1	ALLOTMENT	VEGETATION TYPE	PRESENT RANGE CONDITION GOOD	PRESENT RANGE CONDITION FAIR	PRESENT RANGE CONDITION POOR	PREDICTED RANGE CONDITION GOOD	PREDICTED RANGE CONDITION FAIR	PREDICTED RANGE CONDITION POOR	TOTAL ACRES
610	Maluy								
		Grass	267	717		984			2064
		Desert Shrub	391	368		759			
		Pinyon-Juniper	223	98		321			
703	Spears								
		Sagebrush	2521	6206	1219	8727	1219		21388
		Mountain Shrub	858	3156		4014			
		Pinyon-Juniper		1298	4098	1298	4098		
		Riparian		158	13	158	13		
		Waste			1861		1861		
704	Corcoran Wash								
		Sagebrush		2119		2119			9776
		Mountain Shrub		3031		3031			
		Conifer		137		137			
		Waste		207		207			
		Pinyon-Juniper		2776	1506	2776	1506		
710	Rodeo Grounds								
		Sagebrush			2998		1499	1499	19177
		Mountain Shrub	417		345	417	173	172	
		Waste		1313	310	657	811	155	
		Pinyon-Juniper			13716		6858	6858	
		Conifer	48			48			
		Greasewood			30		15	15	
712	Coon Hollow								
		Greasewood			885		443	442	18561
		Pinyon-Juniper		6680	4044	3340	5362	2022	
		Sagebrush		1539	2791	770	2165	1395	
		Waste			2456		1228	1228	
		Saltbush			166		83	83	
723	Henderson/4A Ridge								
		Sagebrush		705	773	705	773		4094
		Mountain Shrub		1779		1779			
		Conifer	47			47			
		Broadleaf Trees	790			790			
724	Kimball								
		Sagebrush	263	1274	718	1537	718		15275
		Mountain Shrub	135	5455	2621	5590	2621		
		Conifer	2474			2474			
		Waste		2		2			
		Pinyon-Juniper		537	1729	537	1729		
		Broadleaf Trees		45		45			
		Riparian	22			22			
737	Lower Roan Creek Common								
		Sagebrush			379		379		5012
		Mountain Shrub			404		404		

TABLE A9-1 (Continued)

PRESENT AND PREDICTED VEGETATION TYPES AND CONDITION FOR AMPS (INTENSIVE)

ALLOTMENT NUMBER1	ALLOTMENT	VEGETATION TYPE	PRESENT RANGE CONDITION GOOD	PRESENT RANGE CONDITION FAIR	PRESENT RANGE CONDITION POOR	PREDICTED RANGE CONDITION GOOD	PREDICTED RANGE CONDITION FAIR	PREDICTED RANGE CONDITION POOR	TOTAL ACRES
		Waste			1538		1538		
		Pinyon-Juniper			2675		2675		
		Riparian			16		16		
744	Roan Creek Common								
		Mountain Shrub		6154		6154			9261
		Conifer	1462	960		2422			
		Meadow		685		685			
745	Round Mountain								
		Waste		956		956			17626
		Pinyon-Juniper		13715		13715			
		Sagebrush			2726		2726		
		Riparian		26		26			
		Mountain Shrub		95		95			
		Conifer		108		108			
801E	Sunnyside Common								
		Sagebrush		1125	2436	563	1780	1218	7403
		Pinyon-Juniper		2307	1332	1154	1819	666	
		Saltbush			203		102	101	
TOTALS			136338	203086	195611	306786	165582	62667	535035
Best Pasture									
613	Rabbit Valley								
		Grass		4619	1542	2310	3080	771	16834
		Sagebrush		347	37	174	192	18	
		Pinyon-Juniper		4252	1700	2126	2976	850	
		Saltbush		2256	1723	1128	1990	861	
		Greasewood			358		179	179	
713E	Winter Flats								
		Waste		99	245	50	172	122	27055
		Pinyon-Juniper		12487	5152	12487	2576	2576	
		Riparian		34		17	17		
		Grass		662		331	331		
		Sagebrush		5899	2477	2949	4189	1238	
TOTALS				30655	13234	21572	15702	6615	43889
GRAND TOTAL			197857	490367	417536	550463	388823	166474	1,105,760

TABLE A9-1 (Continued)

PRESENT AND PREDICTED VEGETATION TYPES AND CONDITION FOR AMPS (INTENSIVE)

ALLOTMENT NUMBER[1]	ALLOTMENT	VEGETATION TYPE	PRESENT RANGE CONDITION			PREDICTED RANGE CONDITION			TOTAL ACRES
			GOOD	FAIR	POOR	GOOD	FAIR	POOR	

NOTE: Data taken from soil productivity tables developed for each proposed AMP in the Grand Junction Resource Area. See appendix 3 for a detailed description of the methodology used to determine vegetation condition.

[1] E = Allotment with existing AMP, * = allotment partially located in Utah, R = allotment with some pastures under rest rotation, and D = allotment with some pastures under deferred rotation.

TABLE A9-2

PRESENT, PREDICTED, & POTENTIAL FORAGE PRODUCTION FOR AMPS (INTENSIVE)

Allotment1/	Allotment No.	Present Production (AUMs)2/	Potential Production (AUMs)3/	Future Production2/
Deferred Rotation				
Haystack	103	57	938	153
South of the Road	105	30	280	57
East Tom's Canyon Common (E)	106	205	652	205
Longshore	108	298	1,011	360
Fessler	113	38	201	63
Spring Creek	115	603	1,545	725
Aubert Brothers	125	2,561	7,224	2,858
Colorado-Black Ridge	130	1,635	3,549	1,985
Reservation	133	396	611	410
Knowles-Little Dolores Bench	135	824	1,351	912
Timber Ridge	137	595	764	600
Dugway*	145	331	1,955	554
Round Knob	152	327	899	386
Lost Canyon-Sugar Bench*	154	2,168	6,330	2,791
Coates Creek	161	22	57	26
King (R)	163	166	580	206
Whitewater Common	203	2,569	6,078	2,736
Woodring	304	256	964	260
Bulldraw Common	402	138	320	190

TABLE A9-2 (Continued)

PRESENT, PREDICTED, & POTENTIAL FORAGE PRODUCTION FOR AMPS (INTENSIVE)

Allotment1/	Allotment No.	Present Production (AUMs)2/	Potential Production (AUMs)3/	Future Production2/
Wright Draw	405	307	689	310
Blue Mesa	406	1,099	8,395	1,912
Bull Hill-Maverick Common	407	553	2,198	605
Sinbad Valley Common	409	641	1,851	766
Ute Creek Common	410	464	1,234	470
Dolores River	411	103	356	237
North Creek	416	257	1,221	320
Hubbard	419	2,859	5,732	3,166
GML	420	129	324	135
Bergis North Mesa	424	464	1,615	491
Dolores Point*	429	910	1,131	1,001
Hamilton	433	56	77	56
Coal Gulch-Roan Creek (R)	502	1,383	3,023	1,516
Garr Mesa	503	2,439	8,569	2,645
Buniger	505	160	313	165
Lapham Canyon Common	506	276	820	375
Mogensen	508	125	423	132
West Salt Common	603	2,949	16,313	4,309
Crow Bottom	604	211	738	244
Baker-Bitter Creek	612	1,570	4,276	1,711
Prairie Canyon	616	3,552	3,655	3,552
Berry Homestead	702	347	766	358
Brush Mountain Common	705	1,221	2,078	1,300
Burdick E. of Ranch/Tater Hills	706	700	876	700
Doughtery Gulch	714	402	1,286	145
Dry Fork	715	1,120	2,168	1,208

TABLE A9-2 (Continued)

PRESENT, PREDICTED, & POTENTIAL FORAGE PRODUCTION FOR AMPS (INTENSIVE)

Allotment1/	Allotment No.	Present Production (AUMs)2/	Potential Production (AUMs)3/	Future Production2/
Head of Carr Creek	721	440	1,322	264
Logan End Common	732	363	1,094	376
Logan Gulch	733	553	1,719	587
Paddock	742	272	387	290
Upper Brush Mountain	748	580	964	605
Whittaker Flats	754	624	2,122	815
4A Individual	755	79	85	39
Spring Creek to Coon Creek	807	1,230	3,405	1,428
White Mountain Common	808	762	2,342	1,006
Wild Country Common	809	1,020	4,165	1,110
Lyons-Anderson	811	351	773	424
Big Park	843	806	2,545	1,050
Lower Rapid-Cottonwood	844	917	1,510	927
Jerry Gulch	847	217	518	230
TOTALS		45,730	128,337	52,457
Rest Rotation				
Fish Park (E)	101	570	824	570
Bangs Canyon	116	5,423	11,487	6,330
Three Canyons	141	544	1,664	575
Thompson-Northeast Creek	148	438	4,709	490
Meinhart	150	131	527	165
Boulder Canyon-Ladder Canyon	157	563	1,115	580
King (D)	163	1,129	3,951	1,407
Davis (E)	201	427	4,175	427

TABLE A9-2 (Continued)

PRESENT, PREDICTED, & POTENTIAL FORAGE PRODUCTION FOR AMPS (INTENSIVE)

Allotment1/	Allotment No.	Present Production (AUMs)2/	Potential Production (AUMs)3/	Future Production2/
Rañnah Creek Common	202	2,741	7,317	3,698
Gibbler Common (E)	301	3,315	12,514	3,315
Wagon Park Common (E)	302	1,164	15,088	1,164
Palisade Flats	401	575	976	622
Big Salt (E)	501	1,299	5,782	1,299
Coal Gulch-Roan Creek (D)	502	1,170	2,559	1,284
Hunter Wash	504	1,148	3,387	1,411
Little Salt	507	3,056	7,724	3,065
Mt. Garfield Common (E)	509	1,900	5,918	1,900
Badger Wash	601	1,153	2,074	1,166
East Salt (E)	602	9,928	26,145	9,928
Maluy	610	238	424	249
Spears	703	2,489	6,539	3,291
Corcoran Wash (E)	704	1,296	3,490	1,296
Rodeo Grounds	710	1,400	4,073	1,560
Coon Hollow Common	712	1,218	4,041	1,657
Henderson/4A Ridge	723	1,956	4,164	2,072
Kimball	724	2,316	5,735	2,322
Lower Roan Creek Common	737	474	743	480
Roan Creek Common	744	2,657	3,195	2,668
Round Mountain	745	2,279	4,958	2,361
Sunnyside Common (E)	801	1,077	2,507	1,077
TOTALS		54,074	157,805	58,429

Best Pasture

TABLE A9-2 (Continued)

PRESENT, PREDICTED, & POTENTIAL FORAGE PRODUCTION FOR AMPS (INTENSIVE)

Allotment1/	Allotment No.	Present Production (AUMs)2/	Potential Production (AUMs)3/	Future Production2/
Rabbit Valley	613	815	4,629	1,437
Winter Flats (E)	713	2,505	20,824	2,505
TOTALS		3,320	25,453	3,942
GRAND TOTALS (AMPs-Intensive)		103,124	311,615	114,828

NOTE: Present production is based on BLM, Grand Junction Resource Area unit resource analysis and AMPs (intensive). For a discussion of methodology and data base for current production levels and potential production see appendix 3. Predicted production is based on apparent trend of each allotment in the Grand Junction Resource Area and does not include increases from vegetation manipulation projects; see appendix 3 for methodology. Production will vary from year to year depending on precipitation; the figures given are estimated averages.

1/ (E) indicates existing AMP; * indicates allotment is partially located in Utah; (R) indicates allotment has other pastures under rest rotation; and (D) indicates allotment has other pastures under deferred rotation.

2/ AUMs of utilizable livestock forage under proper use.

3/ AUMs of total current annual plant growth at 40% utilization, 1800/lbs./AUM.

APPENDIX 10

TABLE A10-1

IMPACTS ON TERRESTRIAL WILDLIFE

Allotment Name - Number[1/]	Season of Use & Importance of Habitat[2/]	Description of Impacts
Deferred Rotation		
Haystack - 103	Dsu-I, Esu-I	Major increase in forage available to wildlife due to probable reduction in livestock use. Decrease in competition between elk and cattle.
South-of-the-Road - 105	Di-L	Moderate increase in forage available to wildlife due to probable reduction in livestock use and rest every 3 years. Decrease in deer-cattle competition.
Longshore - 108	Ds-I, Di-L, Esu-N	Slight increase in forage production will allow more forage for wildlife. Possible increase in competition due to pipeline making livestock distribution more uniform.
Fessler - 113	Di-L	Moderate increase in forage quality and quantity. All forage reserved for wildlife every 3rd year. Slight decrease in competition.
Spring Creek - 115	Dsu-I, Ew-I	Slight increase in forage for wildlife due to 3-pasture rest rotation. Slight decrease in competition.
Aubert Brothers - 123	Dw-I, Di-L, Esu-I	Little to no improvement in forage quality or quantity. Slight reduction in competition due to probable AUM reduction in livestock use.
Colorado-Black Ridge - 130	Dw-I	Moderate increase in forage quality and quantity. Significant decrease in deer-cattle competition due to probable reduction in livestock use.
Reservation - 133	Dw-L	Major increase in forage production. Significant decrease in deer-cattle competition due to probable reduction in livestock use.
Knowles-Little Dolores Bench - 135	Dw-I	Major increase in forage available to wildlife and reduction in competition due to probable reduction in livestock use.
Timber Ridge - 137	Di-L	No change.

TABLE A10-1 (Continued)

IMPACTS ON TERRESTRIAL WILDLIFE

Allotment Name - Number[1]	Season of Use & Importance of Habitat[2]	Description of Impacts
Dugway - 145*	Dw-C, Dsu-L	Moderate improvement in forage quality and quantity available for wildlife. Decrease in deer-cattle competition due to probable AUM reduction in livestock use.
	Dw-I	Slight improvement in forage production.
Lost Canyon-Sugar Bench - 154*	Dw-I	Moderate improvement in forage available for wildlife. Decrease in competition due to probable AUM reduction in livestock use.
Coates Creek - 161	Di-L	Moderate increase in forage production. Decrease in erosion and competition.
King - 163R	Di-L, Dsu-I, Ew-I	Slight improvement in forage production. Decrease in competition due to probable AUM reduction in livestock use.
Whitewater Common - 203	Dw-C, Ew-I	Little to no change in forage production or competition. Change to slightly later spring use will improve vegetative condition.
Woodring - 304	Dw-I, Ew-L	Slight increase in forage production.
Bull Draw Common - 402	Dw-C, Ew-C	Slight improvement in forage production. Competition remains high.
Wright Draw - 405	Dw-C, Ew-C	Little to no change. Spring rest alternate years may improve forage production somewhat. Competition remains high.
Blue Mesa - 406	Dw-C, Ew-L	Moderate improvement in forage quality and quantity available to wildlife due to probable AUM reduction in livestock use.
Bull Hill-Maverick - 407	Dw-I, Ew-L	Forage production improved slightly. Competition reduced slightly.
Sinbad Valley Common - 409	Dw-C, Ew-L	Moderate improvement in forage available to wildlife due to probable AUM reduction in livestock use.
Ute Creek Common - 410	Dw-C, Ew-L	Complete rest every 3rd year will reserve all forage for wildlife. During other 2 years direct competition between deer and cattle, and elk and cattle will remain the same.
Hamilton - 433	Dw-I	Little to no change.
North Creek - 416	Dw-C, Ew-C	Slight improvement in forage production. Competition reduced slightly due to rotation of pastures.
Hubbard - 839	Dw-I, Dsu-L, Ew-L	Moderate improvement in forage production.

TABLE A10-1 (Continued)

IMPACTS ON TERRESTRIAL WILDLIFE

Allotment Name - Number[1/]	Season of Use & Importance of Habitat[2/]	Description of Impacts
		Restriction of livestock to pasture will lessen competition with wildlife slightly.
GML - 420	Dw-I	Moderate increase in forage production. Reduction of 264 AUMs will increase forage reserved for wildlife.
Dolores Point - 429*	Dw-I	Alternation of spring use by pasture and probable AUM reduction in livestock use will result in a slight improvement in forage quality and quantity.
Bergis North Mesa - 424	Dw-L, Ew-L, Dsu-L	Little to no change.
Dolores River - 411	Dw-I	Moderate improvement in forage quality and quantity due to probable AUM reduction in livestock use.
Garr Mesa - 503	Dw-C, Ds-I, A-L	Slight improvement in forage available to wildlife due to probable AUM reduction in livestock use.
Buniger - 505	Dw-C	Moderate increase in forage quality and quantity.
Lapham Canyon - 506	Ds-I	Additional AUMs available to wildlife due to probable reduction in AUMs.
Mogenson - 508	A-L	Spring rest will provide increase in forage quality and quantity for wildlife.
West Salt - 603	Dw-I, Ds-I, A-L	Major improvement in forage quality and quantity available to wildlife due to probable AUM reduction in livestock reduction in livestock use. Proposed watering facilities will benefit wildlife in addition to improving livestock distribution.
Crow Bottom - 604	Dyrl-N, Mouflon-N	Reduction in spring use should allow slight improvement in wildlife habitat.
Baker/ Bitter Creek - 612	Dyrl-N	Little to no change.
Prairie Canyon - Johns Canyon - 616	Dw-I, Ds-I	Very slight increase in forage production.
Berry Homestead - 702	Dw-I	Very slight increase in forage production.
Brush Mountain - 705	Dw-C, Ew-C	Maintain current excellent wildlife habitat.
Burdick East of Ranch/ Tater Hills - 706	Dw-C	Complete rest every 3rd year will reserve all forage for wildlife. Alternating Sping-Fall use on the other 2 years will improve forage production for wildlife.
Dougherty Gulch - 714	Ds-I	Very slight improvement in forage production and wildlife habitat.

TABLE A10-1 (Continued)

IMPACTS ON TERRESTRIAL WILDLIFE

Allotment Name - Number[1/]	Season of Use & Importance of Habitat[2/]	Description of Impacts
Dry Fork - 715	Dw-I, Ds-I	Slight improvement in forage production. Competition remains same.
Head of Carr Creek - 721	Ds-I, Es-L	Slight improvement in forage production.
Logan End - 732	Ds-I	Maintain current adequate wildlife habitat.
Logan Gulch - 733	Dw-I	Little to no change.
Paddock - 742	Ds-I	Moderate improvement in forage quality and quantity.
Upper Brush Mountain - 748	Ds-I, Es-I	Slight increase in forage production for wildlife.
Whittaker Flats - 754	Dw-C	Forage conditions will continue to improve. Competition between sheep and deer will remain high.
4A-Individual - 755	Dw-I	Slight increase in forage production. Increased competition.
Spring Creek - 807	Dw-I, Ds-L	Little to no change. Reduction in spring use may increase forage vigor.
White Mountain - 808	Dw-C	Slight increase in forage production.
Wild Country - 809	Dw-C	Slight increase in forage production.
Lyons-Anderson - 811	Dw-I, Ew-C	Probable reduction in winter sheep use will result in improved browse condition important to wintering big game species.
Big Park - 843	Dw-I	Reduction in spring use will allow increase in forage vigor. Competition will be increased.
Lower Rapid-Cottonwood - 835	Dw-C, Ew-I	Slight increase in forage production.
Jerry Gulch - 847	Dw-C	No change.
Rest Rotation		
Bangs Canyon - 116	Dw-I, Dsu-I, Di-L, Esu-I	Slight increase in forage production. Competition will decrease slightly with a probable AUM reduction in livestock use.
Three Canyons - 141	Dw-I	Slight increase in forage. Some competition between sheep and cattle.
Thompson-North East Creek - 148	Dw-I, Dsu-I	Slight improvement in forage production. Competition remains static.
Meinhart - 150	Di-L, Dsu-L, Ew-N, Ewu-N	Slight improvement in forage production. Competition

TABLE A10-1 (Continued)

IMPACTS ON TERRESTRIAL WILDLIFE

Allotment Name - Number1/	Season of Use & Importance of Habitat2/	Description of Impacts
		lowered.
Boulder Canyon-Ladder Canyon - 157	Dw-I	Slight improvement in forage quality and quantity.
Kannah Creek - 202	Dw-C, Ew-I, A-I	Slight to moderate improvement in forage quality and quantity due to probable AUM reduction in livestock use.
Palisade Flats - 401	Dw-C	Little change in forage production. Perhaps a decrease in competition by having 3 pastures rested each winter
Coal Gulch-Roan Creek - 502D	Dw-C, Ds-I	Significant increase in forage production. Decrease in deer/livestock competition.
Little Salt - 507	Dw-C, A-L	Reduction of 535 AUMs will result in more forage reserved for wildlife.
Badger Wash - 601	A-L	Very slight increase in forage production.
Maluy - 610	Dyrl-N, Mouflon-N	Slight increase in forage production.
Spears - 703	Dw-C, Ds-I	Moderate increase in forage production for wildlife.
Rodeo Grounds - 710	Dw-C	Moderate increase in forage quality and quantity. Slight reduction in deer/livestock competition.
Henderson-4A Ridge - 723	Ds-I, Es-L	Slight increase in forage production.
Kimball - 724	Dw-C,Ds-I, Es-L	Moderate improvement in wildlife habitat.
Lower Roan Creek - 737	Dw-I, Ds-I	Slight improvement in forage production.
Roan Creek Common - 744	Ds-I, Es-L, Ew-I	Maintain current adequate wildlife habitat.
Round Mountain - 745	Dw-C, Di-I	Reduction of 421 AUMs, and reduction of spring use compared to fall use should moderately increase wildlife habitat values.
Best Pasture		
Rabbit Valley	Dyrl-N	Slight improvement in forage for wildlife due to probable reduction in livestock use.

1/ R = Allotment has other pastures under rest rotation, D = allotment has other pastures under deferred rotation, * = allotment is partially located in Utah.

2/ D = mule deer, E = elk, and A = antelope; W = winter range, su = summer range, i = intermediate range (spring and fall), and yrl = yearlong; C = habitat crucial to survival of population; I = habitat important to population; L = habitat of little importance to population; and N = habitat of negligible importance to population.

APPENDIX 11

TABLE A11-1

PRESENT AND PREDICTED RIPARIAN AND AQUATIC WILDLIFE HABITAT

Water Body	Perennial or Intermittent 1/	Public Habitat mi/ac 1/	% of Total Habitat	Present Riparian* Habitat 2/				Predicted Riparian* Habitat Changes				Present Aquatic Habitat 3/				Predicted Aquatic Habitat Changes				Fishery Habitat 4/
				Ex	G	F	P	Ex	G	F	P	Ex	G	F	P	Ex	G	F	P	
Gunnison River	P	9	38		6	3			NC	NC			9				NC			Channel catfish, suckers, carp, roundtail chub, humpback sucker, Colorado squaw fish, humpback chub
Pig Dominguez	P	15	52		12	3			+3	-3			2	5	8		+3	-5	+2	Rainbow, brook trout
Little Dominguez	P	14	88		10	4			+4	-4				5	9			+9	-9	Suckers
East	I	5.8	34			5.8			+1.5	-3.8	+2.3				5.8			+1.5	-1.5	
Northeast	P	5.5	55		5.5				NC						5.5				NC	Cutthroat trout
Dolores River	P	17	59			6	11		+7	+2.5	-9.5				17				NC	Channel catfish, carp, suckers, rainbow, bullhead
Blue	P	7.6	69		3		4.6		+.5	+4.1	-4.6				7.6		+2	+4.1	-6.1	Rainbow, suckers
Calamity	I	6.8	57		1.8	3	2		+.2	+1.8	-2				6.8				NC	
West	P	4	18		3	1			+.6	-.6		3		1		NC	+1	-1		Rainbow, brook, cutthroat, brown trout
Ute	P	4	63	4				NC						4				NC		
North	P	3.1	52		2.9	.2			+.2	-.2		3.1				NC				Rainbow, brook trout
Plateau	P	5.3	18		3	2.3			NC	NC			.5		4.8		NC		NC	Rainbow, brown trout, roundtail chub, suckers
Colorado River	P	10	42		10				NC					10				NC		Channel catfish, bullhead, roundtail chub, sucker, large mouth bass, humpback sucker, Colorado River squawfish, carp, humpback chub
Cottonwood	P	4	62		4				NC					4				NC		
Rapid	P	2.5	36		2.5				NC						2.5				NC	
Spring (E. Fork)	P	1	14			1			+1	-1				1				NC		
Bull	P	.25	3		.25				NC					.25			NC			Cutthroat trout
Salt (E. Fork)	P	.25	6			.25				NC					.25				NC	
Leon	P	1	9		1				NC				1				NC			Rainbow, cutthroat, brown, brook trout

TABLE A11-1 (Continued)

PRESENT AND PREDICTED RIPARIAN AND AQUATIC WILDLIFE HABITAT

Water Body	Perennial or Intemittent 1/	Public Habitat mi/ac 1/	% of Total Habitat	Present Riparian* Habitat 2/				Predicted Riparian* Habitat Changes				Present Aquatic Habitat 3/				Predicted Aquatic Habitat Changes				Fishery Habitat 4/
				Ex	G	F	P	Ex	G	F	P	Ex	G	F	P	Ex	G	F	P	
West Hawxhurst	P	1.5	21		1.5				NC				1.5				NC			Rainbow, cutthroat trout
East Hawxhurst	P	1.5	100		1.5				NC				1.5				NC			Rainbow, cutthroat trout
Kannah	P	.25	1			.25				NC			.25				NC			Rainbow, cutthroat, brown trout
Jerry Creek Res (#1)	P	1.3/24	60			1.3				NC				24ac				NC		Rainbow, brook trout
Hollenbeck Res.	P	.2/2.5	5		.2				NC				25ac				NC			Largemouth bass
6-50 Res.	I	.6/10	100		.6				NC						10ac				NC	
Ruby Lee Res.	I	1.2/10	100			1.2				NC					10ac				NC	
Echo Lake (Melhone L.)	I	.5/10	25			.5				NC					10ac				NC	
Kannah (N. Fork)	P	1.4	14		1.4				NC					1.4				NC		Rainbow trout
Kimball	P	.2	1.25			.2				NC					.2				NC	Rainbow trout
Roan	P	7	23			7			+3.5	-3.5				7			+1	-1		Rainbow, cutthroat, brook trout
Carr	P	5	45	.5	.5	4		NC	+1	-1			.3		4.7		+3.7	+1	-4.7	Brook trout
Brush	P	2.2	22			1.2	1			NC	NC			1.2	1			NC	NC	Rainbow trout
Clear	P	.5	2			.5				NC				.5				NC		Rainbow trout
Little Dolores River	P	4	16		.5	1.5	2		NC	NC	NC			4				NC		Rainbow, brook trout
North Lobe	P	1.5	19		1.5				NC					1.5				NC		Rainbow trout
Barrel Springs Canyon	P	6.4	100				6.4		+5	+1.4	-6.4				6.4				NC	
Barrel Spring (R. Fork)	P	2.6	100				2.6		+2	+.6	-2.6				2.6				NC	
Fall	P	1.25	100		1.25				NC						1.25				NC	
East Salt	P	14.5	54				14.5				NC				14.5				NC	
Beezer	P	1.8	19			1.8			+1.8	-1.8					1.8				NC	Few trout reported
Corral Canyon	P	3	100				3				NC				3				NC	
Corral Canyon Res.	P	.2/5	100				.2				NC				5ac				NC	
Hay Canyon	P	1.2	28			1.2			+1.2	-1.2					1.2				NC	
Calf Canyon	P	3.4	85				3.4			+3.4	-3.4				3.4				NC	
Trail Canyon	P	1	7			1			+.5	-.5					1				NC	
Collier	P	1	17			1				NC				1					NC	

TABLE A11-1 (Continued)

PRESENT AND PREDICTED RIPARIAN AND AQUATIC WILDLIFE HABITAT

Water Body	Perennial or Intermittent1/	Public Habitat mi/ac1/	% of Total Habitat	Present Riparian* Habitat2/				Predicted Riparian* Habitat Changes				Present Aquatic Habitat3/				Predicted Aquatic Habitat Changes				Fishery Habitat4/
				Ex	G	F	P	Ex	G	F	P	Ex	G	F	P	Ex	G	F	P	
Total (miles)		181.3		4.5	73.9	52.2	50.7		+33.0	-6.8	-26.2	6.1	16.05	46.85	108.3		+10.7	+8.6	-19.3	
(acres)		61.5											2.5	24.0	35.0					

1/ From USGS quadrant maps and BLM surface management quadrant maps.

2/ The riparian community is the habitat of the stream and pond banks and bottoms containing terrestrial plants and animals in need of a nearby source of continuous water or the organisms that associate with these plants and animals. The riparian communities are classified according to the following system.

Excellent: diversity and abundance of typical riparian plants (trees, shrubs, forbs, grasses, etc.) and animals (mammals, birds, amphibians, invertebrates, etc.) good; good age distribution, reproduction evident; soil mostly covered with vegetation, bank erosion generally lacking; cover for animals abundant; vegetation shades water most of the day.

Good: most groups of typical riparian plants and animals present at or near stream border, but numbers may be reduced; age diversity fair, reproduction evident; some bare soil areas noticeable, but erosion at low levels; riparian animals somewhat reduced or typical species missing due to cover loss; vegetation shades water at least part of the day.

Fair: many of the typical riparian plants and animals rare or missing from stream border; age diversity lacking, little sign of reproduction; bare soil may be common; animal populations greatly reduced because of lack of cover and may only be transitory in the community; vegetative shade on stream lacking or only during morning and evening hours.

Poor: typical riparian plants and animals scanty or lacking in both numbers and diversity; little age variation, no sign of reproduction; range plants (e.g., rabbitbrush, sagebrush) abundant down to water edge; erosion of bare soil normally high, but may be reduced in monotypic grass communities which provide good ground cover but little diversity or animal cover; no shade on water from vegetation.

3/ The aquatic community is composed of a watery habitat and those organisms that are partially or totally submerged in it for most of their lives. The aquatic communities are classified according to the following system.

Excellent: abundant, diverse, and stable community; cover for fish available; pools and riffles supporting optimum production of producers and consumers.

Good: community diverse, but below potential; cover available, but somewhat reduced; pools and riffles supporting good numbers of producers and consumers.

Fair: community noticeably limited in numbers and diversity; cover limited and limiting animal populations; some fish present, but populations and reproductive potentials reduced by the habitat.

Poor: community barely surviving; cover lacking; a few fish may be surviving, but little chance of continued survival; diversity of invertebrates low, but numbers of certain species may be high.

4/ Fishery information was taken from DOW's creel census, electroshocking, gill net, and stocking records at the Northwest Regional Office.

* Riparian habitat units for streams and reservoirs are given in linear miles.

APPENDIX 12

Appendix 12

RANCH ECONOMICS

The ranch economic analysis in this appendix is based on a study conducted by the Range Science Department at Colorado State University. The study, as of December 1978, is in the final stage of completion and was funded by the State of Colorado, U.S. Forest Service, and the Bureau of Land Management.

The study involved extensive survey work on 135 ranching operations in Colorado that graze livestock on Federally owned lands. The survey method was personal interview and the ranching operations were randomly selected from all ranches in Colorado that graze livestock on Federally owned lands.

The study divided Colorado into five regions, each of which exhibited certain ranching characteristics.

A variety of ranch models was developed for each region, depending upon size and livestock class groupings evident from the survey work. The Grand Junction Environmental Statement area is in the southwest study region. Eight ranch models were developed for this region from the survey results obtained from forty-four ranching operations. These ranch models are thought to be accurately representative of the ES area ranches, with the survey sample even containing some of the 138 area ranches grazing livestock on BLM lands.

Linear programming techniques were applied to the eight models in order to make estimates of gross revenue, net revenue, property tax, and hired ranch employment changes for use in the text of this document.

Ranch budgets are displayed for each of the eight ranch models. (See figures A12-1 -A12-8.) The ranch budgets were constructed from the study survey data and from computer runs of the eight models. The ranch budgets display three scenarios for each model; the present situation, a twenty-five percent reduction in BLM grazing, and a one hundred percent reduction in BLM grazing. The budgets contain three sections; operating expense, total annual livestock inventory carrying and depreciation costs, and gross revenue. Gross revenue results from sales to final demand by these ranches and net revenue is derived by subtracting operating expense and livestock inventory carrying and depreciation costs from gross revenue. Net revenue is considered to be personal income to ranch families.

Ranch family and operator labor is indicated but not costed in the operating expense portion of the ranch budgets. To the extent that net revenues are not adequate compensation to ranch families and operators for labor inputs, they would be subsidizing ranching operations with their labor.

The 138 ES area ranching operations which graze livestock on BLM lands were grouped by size and livestock class into the eight ranch models. Present BLM forage use and forage use reductions resulting from the proposed action and alternatives were tracked from each allotment to the individual ranching operations. When these forage use considerations involved common use allotments, a proration of use among operators was made based on 1977 use proportions. Private grazing lands within the allotments were also considered in tracking forage use changes to the ranching operations since their use is regulated on a proportioned basis to BLM forage use as a condition of the allotment program. Thus, any combination of BLM forage use, whether it is on one or several allotments or is of single or combined use or is in combination with private land use, has been associated with the respective ranching operations. The BLM forage use, and associated private forage use where appropriate, were used to identify the average forage use and forage use changes indicated in tables in the text of this document. These average forage use AUM numbers were applied to the eight ranch models to derive the estimated ranch economic effects from BLM forage use.

BLM forage use was spread proportionally in the models based on the season of use information obtained from the study survey work. Table A12-1 indicates these use patterns by season. The four seasons are equal quarters based on Julian calander dates. As BLM forage use was altered, the models adjusted, supplying forage available on the ranches during the four seasons to the extent that private forage was available. When private forage was lacking to adjust to the changes, livestock herd size

FIGURE A12-1

RANCH BUDGET MODEL 1

CATTLE 0 to 249

OPERATING EXPENSE	UNIT	RATE $/UNIT	PRESENT		25% REDUCTION		100% REDUCTION	
			# of UNITS	TOTAL EXPENSE	# of UNITS	TOTAL EXPENSE	# of UNITS	TOTAL EXPENSE
Taxes				$ 1,476		$ 1,451		$ 1,384
Marketing Expense				353		306		180
Ranch Business				500		500		500
Interest on Production[1]				802		742		564
General Supplies				1,050		1,050		1,050
Utilities				625		625		625
Veterinary				503		435		257
Insurance				675		675		675
Equipment Rental				500		500		500
Fuel-Lube				1,800		1,800		1,800
Shearing				0		0		0
Water Assessment				250		250		250
Fence-Building Repair				1,233		1,233		1,233
Machine-Equip. Repair				1,325		1,325		1,325
Custom Hire				150		150		150
Fertilizer-Chemical				567		567		567
Seed				0		0		0
Feed Purchases								
1. Alfalfa	ton	58	43	2,494	43	2,494	43	2,494
2. Hay	ton							
3. Grain	bushel	.95	674	640				
4. Supplement	ton							
5. Salt	ton	73	3.3	241	2.9	212	1.7	124
Trucking				407		353		200
Labor								
1. Hired[2]	man years		.32	2,171	.28	1,886	.16	1,067
2. Operator	man years		1.0		.87		.49	
3. Family	man years		2.0		1.74		.99	
Land Leases								
1. Range	AUM							
2. Irr. Pasture	AUM							
3. Hay	acre							
4. Alfalfa	acres							
5. Grain	acres							
6. Row Crop	acres							
7. Aftermath	AUM							
Grazing Fees								
1. Forest Service	AUM	1.60	295	472	295	472	295	472
2. BLM	AUM	1.51	184	278	138	208	0	0
3. State	AUM							
Federal Land Expenses								
1. Grazing Assoc. Fees				125		125		125
2. Maintenance Costs				375		375		188
Ram Lease	head							
Yearling Calf Purchase	head							
TOTAL				$ 19,012		$ 17,734		$ 15,730

LIVESTOCK INVENTORY	VALUE/ HEAD $	PRESENT			25% REDUCTION			100% REDUCTION		
		#	TOTAL VALUE $	ANNUAL COST $	#	TOTAL VALUE $	ANNUAL COST $	#	TOTAL VALUE $	ANNUAL COST $
Cows	286	127	36,322	3,269	110	31,460	2,832	62	17,732	1,596
Bulls	603	6	3,618	816	5	3,015	681	3	1,809	408
1st Replacement Heifers	250	21	5,250	473	18	4,500	405	11	2,750	248
2nd Replacement Heifers	286	20	5,720	515	17	4,862	438	10	2,860	257
Yearlings	250	0			0					
Horses	477									
1. Ranch Use		6			6			6		
2. Total		6	2,862	490	6	2,862	490	6	2,862	490
Total Annual Inventory Carrying & Depreciation Costs				5,563			4,846			2,999

GROSS REVENUE	UNITS	$/ UNIT	PRESENT		25% REDUCTION		100% REDUCTION	
			# UNITS	TOTAL VALUES $	# UNITS	TOTAL VALUE $	# UNITS	TOTAL VALUE $
Cattle								
Calf Sales	head	178	92	16,376	80	14,240	45	8,010
Yearling Sales	head							
Cull Cows	head	286	16	4,576	14	4,004	8	2,288
Cull Bulls	head	420	1	420	1	420	1	420
Horse Sales	head	322	1	322	1	322	1	322
TOTAL GROSS REVENUE				$21,694		$18,986		$11,040
Total Operating Expenses				-19,012		-17,734		-15,730
Total Annual Livestock Inventory Carrying & Depreciation Costs				- 5,563		- 4,846		- 2,999
NET REVENUE (Direct Ranch Income)				$-2,881		$-3,594		$- 7,689

NOTE: Prices have been normalized by considering a 5 year base (1974-1978) and weighing that base according to trends. Rounding to the nearest dollar has been done wherever possible to aid in the display of costs, prices, and revenues.

[1] Calculated at a rate of 9% for six months.

[2] Hired labor man years and costs are an aggregation of manager, seasonal, temporary, and annual employment.

[3] The price for lambs is prorated from a composition of 75% fats and 25% feeders.

FIGURE A12-2

RANCH BUDGET MODEL 2

CATTLE 250 to 549

OPERATING EXPENSE	UNIT	RATE $/UNIT	PRESENT		25% REDUCTION		100% REDUCTION	
			# of Units	TOTAL EXPENSE	# of UNITS	TOTAL EXPENSE	# of UNITS	TOTAL EXPENSE
Taxes				$ 3,468		$ 3,408		$ 3,234
Marketing Expenses				1,258		1,100		644
Ranch Business				760		760		760
Interest on Production1/				1,579		1,418		1,211
General Supplies				1,380		1,380		1,380
Utilities				800		800		800
Veterinary				898		786		460
Insurance				2,080		2,080		2,080
Equipment Rental				600		600		600
Fuel-Lube				2,760		2,760		2,760
Shearing				0		0		0
Water Assessment				700		700		700
Fence-Building Repair				850		850		850
Machine-Equip. Repair				2,125		2,125		2,125
Custom Hire				500		500		500
Fertilizer-Chemical				2,280		2,280		2,280
Seed				100		100		100
Feed Purchases								
1. Alfalfa	ton	58	29	1,682	29	1,682	29	1,682
2. Hay	ton	58	18	1,044	18	1,044	18	1,044
3. Grain	bushel	1.90	643	1,222	648	1,231	648	1,231
4. Supplement	ton	154	7	1,078	0	0	0	0
5. Salt	ton	73	5.92	432	5.24	403	3.07	236
Trucking				402		352		202
Labor								
1. Hired2/	man years		.918	5,527	.803	4,833	.461	2,772
2. Operator	man years		1.687		1.475		.846	
3. Family	man years		1.343		1.175		.674	
Land Leases								
1. Range	AUM							
2. Irr. Pasture	AUM							
3. Hay	acres	37	60	2,220	60	2,220	60	2,220
4. Alfalfa	acres	44	10	440	10	440	10	440
5. Row Crop	acres							
Grazing Fees								
1. Forest Service	AUM	1.60	1,501	2,402	1,501	2,402	1,501	2,402
2. BLM	AUM	1.51	754	1,139	564	852	0	0
3. State	AUM		0	0	0	0	0	0
Federal Land Expenses								
1. Grazing Assoc. Fees				300		300		300
2. Maintenance Costs				583		583		583
Yearling Calf Purchases								
Ram Lease	head							
TOTAL				$ 40,609		$ 37,989		$ 33,596

LIVESTOCK INVENTORY	VALUE/ HEAD $	PRESENT			25% REDUCTION			100% REDUCTION		
		#	TOTAL VALUE $	ANNUAL COST $	#	TOTAL VALUE $	ANNUAL COST $	#	TOTAL VALUE $	ANNUAL COST $
Cows	286	314	89,804	8,077	275	78,595	7,074	158	45,156	4,064
Bulls	603	15	9,045	2,040	13	7,839	1,770	8	4,824	1,089
1st Replacement Heifers	250	53	13,250	1,193	46	11,500	1,035	27	6,750	608
2nd Replacement Heifers	286	52	14,872	1,338	45	12,861	1,158	26	7,431	669
Yearlings	250	21	5,250	276	18	4,500	237	11	2,750	145
Ewes										
Bucks										
Replacement Ewes										
Horses										
1. Ranch Use	477	6			6			6		
2. Total Horses	477	6	2,862	490	6	2,862	490	6	2,862	490
Total Annual Inventory Carrying & Depreciation Costs				$ 13,414			$ 11,764			$ 7,040

GROSS REVENUE	UNITS	$/ UNIT	PRESENT		25% REDUCTION		100% REDUCTION	
			# UNITS	TOTAL VALUES $	# UNITS	TOTAL VALUE $	# UNITS	TOTAL VALUE $
Cattle								
Calf Sales	head	178	207	36,846	181	32,218	104	18,512
Yearling Sales	head	355	21	7,455	18	6,390	11	3,905
Cull Cows	head	286	41	11,726	36	10,296	21	6,006
Cull Bulls	head	420	3	1,260	3	1,260	2	840
Sheep								
Lambs3/	head							
Cull Ewes	head							
Cull Bucks	head							
Wool Sales	lbs.							
Horse Sales	head	322	1	322	1	322	1	322
TOTAL GROSS REVENUE				$57,609		$50,486		$29,585
Total Operating Expenses				- 40,609		-37,989		- 33,596
Total Annual Livestock Inventory Carrying & Depreciation Costs				- 13,414		-11,764		- 7,040
NET REVENUE (Direct Ranch Income)				$ 3,586		$ 733		-$ 11,061

NOTE: Prices have been normalized by considering a 5 year base (1974-1978) and weighing that base according to trends. Rounding to the nearest dollar has been done wherever possible to aid in the display of costs, prices, and revenues.

1/ Calculated at a rate of 9% for six months.

2/ Hired labor man years and costs are an aggregation of manager, seasonal, temporary, and annual employment.

3/ The price for lambs is prorated from a composition of 75% fats and 25% feeders.

FIGURE A12-3

RANCH BUDGET MODEL 3

CATTLE 550 to 749

OPERATING EXPENSE	UNIT	RATE $/UNIT	PRESENT		25% REDUCTION		100% REDUCTION	
			# of UNITS	TOTAL EXPENSE	# of UNITS	TOTAL EXPENSE	# of UNITS	TOTAL EXPENSE
Taxes				$ 4,467		$ 4,350		$ 3,998
Marketing Expense				4,000		3,335		1,363
Ranch Business				1,917		1,917		1,917
Interest on Production[1]				4,194		3,737		2,408
General Supplies				5,033		5,033		5,033
Utilities				1,760		1,760		1,760
Veterinary				1,350		1,126		460
Insurance				2,650		2,650		2,650
Equipment Rental				83		83		83
Fuel-Lube				4,733		4,733		4,733
Shearing								
Water Assessment				1,560		1,560		1,560
Fence-Building Repair				567		567		567
Machine-Equip. Repair				4,650		4,650		4,650
Custom Hire				50		50		50
Fertilizer-Chemical				3,500		3,500		3,500
Seed				367		367		367
Feed Purchases								
1. Alfalfa	ton	58	33	1,914	33	1,914	33	1,914
2. Hay	ton	58	7	406	7	406	7	406
3. Grain	bushel	1.90	974	1,851	974	1,851	974	1,851
4. Supplement	ton	154						
5. Salt	ton	73	4.8	350	4.0	292	1.6	117
Trucking				1,733		1,441		578
Labor								
1. Hired[2]	man years		2.42	13,832	2.01	11,504	.81	4,611
2. Operator	man years		.83		.69		.27	
3. Family	man years		2.83		2.35		.94	
Land Leases								
1. Range	AUM							
2. Irr. Pasture	AUM							
3. Hay	acre							
4. Alfalfa	acres							
5. Grain	acres							
Grazing Fees								
1. Forest Service	AUM	1.60	1,621	2,594	1,621	2,594	1,621	2,594
2. BLM	AUM	1.55	1,523	2,300	1,141	1,723	0	0
3. State	AUM	3.11	6	19	6	19	6	19
Federal Land Expenses								
1. Grazing Assoc. Fees				1,317		1,317		1,317
2. Maintenance Costs				383		383		255
Yearling Calf Purchase	head	167	199	33,233	165	27,555	66	11,022
TOTAL				$100,813		$ 90,272		$ 59,783

LIVESTOCK INVENTORY	VALUE/ HEAD $	PRESENT			25% REDUCTION			100% REDUCTION		
		#	TOTAL VALUE $	ANNUAL COST $	#	TOTAL VALUE $	ANNUAL COST $	#	TOTAL VALUE $	ANNUAL COST $
Cows	286	314	89,741	8,076	261	74,646	6,719	105	30,030	2,703
Bulls	603	15	9,045	2,040	13	7,839	1,770	5	3,015	681
1st Replacement Heifers	250	52	13,000	1,170	43	10,750	968	17	4,250	383
2nd Replacement Heifers	286	50	14,290	1,286	42	12,012	1,081	16	4,576	412
Yearlings	250	82	20,500	1,845	68	17,000	893	27	6,750	355
Pruchased Yearlings	246	199	48,954	2,621	165	40,590	2,173	66	16,236	869
Horses										
1. Ranch Use	477	10			10			10		
2. Total	477	10	4,770	817	10	4,770	817	10	4,770	817
Total Annual Inventory Carrying & Depreciation Costs				17,855			14,421			6,220

GROSS REVENUE	UNITS	$/ UNIT	PRESENT		25% REDUCTION		100% REDUCTION	
			# UNITS	TOTAL VALUES $	# UNITS	TOTAL VALUE $	# UNITS	TOTAL VALUE $
Cattle								
Calf Sales	head	178	137	24,386	114	20,292	46	8,188
Yearling Sales	head	355	279	99,045	231	82,005	92	32,660
Cull Cows	head	286	41	11,726	34	9,724	14	4,004
Cull Bulls	head	420	3	1,260	3	1,260	1	420
Sheep								
Lambs								
Cull Ewes								
Cull Bucks								
Wool Sales								
Horse Sales	head	322	1	322	1	322	1	322
TOTAL GROSS REVENUE				136,739		113,603		45,594
Total Operating Expenses				-100,813		-90,272		-59,783
Total Annual Livestock Inventory Carrying & Depreciation Costs				- 17,855		-14,421		- 6,220
NET REVENUE (Direct Ranch Income)				$ 18,071		$ 8,910		$-20,409

NOTE: Prices have been normalized by considering a 5 year base (1974-1978) and weighing that base according to trends. Rounding to the nearest dollar has been done wherever possible to aid in the display of costs, prices, and revenues.

[1] Calculated at a rate of 9% for six months.

[2] Hired labor man years and costs are an aggregation of manager, seasonal, temporary, and annual employment.

[3] The price for lambs is prorated from a composition of 75% fats and 25% feeders.

FIGURE A12-4

RANCH BUDGET MODEL 4

CATTLE 750 to GREATER

OPERATING EXPENSE	UNIT	RATE $/UNIT	PRESENT		25% REDUCTION		100% REDUCTION	
			# of UNITS	TOTAL EXPENSE	# of UNITS	TOTAL EXPENSE	# of UNITS	TOTAL EXPENSE
Taxes				$ 5,671		$ 5,495		$ 4,935
Marketing Expense				6,844		5,962		3,140
Ranch Business				3,521		3,521		3,521
Interest on Production[1]				6,610		5,865		4,151
General Supplies				5,114		5,114		5,114
Utilities				3,792		3,792		3,792
Veterinary				2,636		2,296		1,209
Insurance				4,957		4,957		4,957
Equipment Rental				836		836		836
Fuel-Lube				9,150		9,150		9,150
Shearing				0		0		0
Water Assessment				1,181		1,181		1,181
Fence-Building Repair				3,671		3,671		3,671
Machine-Equip. Repair				8,445		8,445		8,445
Custom Hire				154		154		154
Fertilizer-Chemical				7,207		7,207		7,207
Seed				729		729		729
Feed Purchases								
1. Alfalfa	ton	58	31	1,798	31	1,798	31	1,798
2. Hay	ton	58	55	3,190	55	3,190	55	3,190
3. Grain	bushel	1.90	402	764	402	764	402	764
4. Supplement	ton	154	29.8	4,589	0	0	0	0
5. Salt	ton	73	7.9	577	6.9	504	3.6	263
Trucking				4,163		3,623		1,880
Labor								
1. Hired[2]	man years		2.54	15,381	2.21	13,385	1.15	6,945
2. Operator	man years		1.14		1.00		.51	
3. Family	man years		1.43		1.24		.64	
Land Leases								
1. Range	AUM							
2. Irr. Pasture	AUM							
3. Hay	acres							
4. Alfalfa	acres							
5. Grain	acres							
Grazing Fees								
1. Forest Service	AUM	1.60	1,483	2,373	1,483	2,373	1,483	2,373
2. BLM	AUM	1.51	2,038	3,077	1,527	2,306	0	0
3. State	AUM	3.11	142	442	142	442	142	442
Federal Land Expenses								
1. Grazing Assoc. Fees				179		179		179
2. Maintenance Costs				786		786		523
Yearling Calf Purchase	head	167	275	45,925	239	39,913	124	20,708
TOTAL				$153,762		$137,638		$101,657

LIVESTOCK INVENTORY	VALUE/ HEAD $	PRESENT			25% REDUCTION			100% REDUCTION		
		#	TOTAL VALUE $	ANNUAL COST $	#	TOTAL VALUE $	ANNUAL COST $	#	TOTAL VALUE $	ANNUAL COST $
Cows	286	599	171,314	15,420	521	149,006	13,412	270	77,220	6,951
Bulls	603	28	16,884	3,811	24	14,472	3,267	13	7,839	1,770
1st Replacement Heifers	250	99	24,750	2,228	86	21,500	1,935	45	11,250	1,013
2nd Replacement Heifers	286	95	27,170	2,446	83	23,738	2,137	43	12,298	1,107
Yearlings	250	267	66,750	3,511	232	58,000	3,051	121	30,250	1,591
Ranch Yearlings	246	275	67,650	3,662	239	58,794	3,147	124	30,504	1,633
Horses										
1. Ranch Use	477	12			12			12		
2. Total	477	17	8,109	1,384	17	8,109	1,389	17	8,109	1,389
Total Annual Inventory Carrying & Depreciation Costs				32,427			28,338			15,454

GROSS REVENUE	UNITS	$/ UNIT	PRESENT		25% REDUCTION		100% REDUCTION	
			# UNITS	TOTAL VALUES $	# UNITS	TOTAL VALUE $	# UNITS	TOTAL VALUE $
Cattle								
Calf Sales	head	178	167	29,726	145	25,810	76	13,528
Yearling Sales	head	355	542	192,410	471	167,205	245	86,975
Cull Cows	head	286	78	22,308	68	19,448	35	10,010
Cull Bulls	head	420	6	2,520	5	2,100	3	1,260
Horse Sales	head	322	1	322	1	322	1	322
TOTAL GROSS REVENUE				$247,286		$214,885		$111,773
Total Operating Expenses				-153,762		-137,638		-101,657
Total Annual Livestock Inventory Carrying & Depreciation Costs				- 32,427		- 28,338		- 15,454
NET REVENUE (Direct Ranch Income)				$ 61,097		$ 48,909		$ 5,338

NOTE: Prices have been normalized by considering a 5 year base (1974-1978) and weighing that base according to trends. Rounding to the nearest dollar has been done wherever possible to aid in the display of costs, prices, and revenues.

[1] Calculated at a rate of 9% for six months.

[2] Hired labor man years and costs are an aggregation of manager, seasonal, temporary, and annual employment.

[3] The price for lambs is prorated from a composition of 75% fats and 25% feeders.

FIGURE A12-5

RANCH BUDGET MODEL 5

CATTLE 0 to 220
SHEEP 0 to 1000

OPERATING EXPENSE	UNIT	RATE $/UNIT	PRESENT		25% REDUCTION		100% REDUCTION	
			# of UNITS	TOTAL EXPENSE	# of UNITS	TOTAL EXPENSE	# of UNITS	TOTAL EXPENSE
Taxes				$ 2,693		$ 2,677		$ 2,620
Marketing Expense				332		307		228
Ranch Business				600		600		600
Interest on Production[1/]				1,249		1,288		1,130
General Supplies				1,750		1,750		1,750
Utilities				675		675		675
Veterinary				300		277		206
Insurance				1,275		1,275		1,275
Equipment Rental				325		325		325
Fuel-Lube				2,050		2,050		2,050
Shearing				644		597		458
Water Assessment				1,066		1,066		1,066
Fence-Building Repair				550		550		550
Machine-Equip. Repair				1,767		1,767		1,767
Custom Hire				2,000		2,000		2,000
Fertilizer-Chemical				625		625		625
Seed				100		100		100
Feed Purchases								
1. Alfalfa	ton	58	0		10.8	626	0	0
2. Hay	ton	58	0		25	1,450	0	0
3. Grain	bushel	1.90						
4. Supplement	ton							
5. Salt	ton	73	1.9	139	1.7	124	1.3	95
Trucking				762		700		515
Labor								
1. Hired[2/]	man years		22	1,511	.20	1,356	13	910
2. Operator	man years							
3. Family	man years							
Land Leases								
1. Range	AUM	6.38	370	2,361	363	2,316	326	2,080
2. Irr. Pasture	AUM	6.63	0	0	39	259	39	259
3. Hay	acres							
4. Alfalfa	acres	44	25	1,100	25	1,100	25	1,100
5. Grain	acres	44			27.5	1,210	14.8	651
Grazing Fees								
1. Forest Service	AUM	1.60	389	622	389	622	389	622
2. BLM	AUM	1.51	636	960	476	719	0	0
3. State	AUM	3.11	186	578	186	578	186	578
Federal Land Expenses								
1. Grazing Assoc. Fees				0		0		0
2. Maintenance Costs				500		500		333
Yearling Calf Purchase	head	167	15	2,505	13	2,505	10	1,670
TOTAL				$ 29,039		$ 31,994		$ 26,238

LIVESTOCK INVENTORY	VALUE/HEAD $	PRESENT			25% REDUCTION			100% REDUCTION		
		#	TOTAL VALUE $	ANNUAL COST $	#	TOTAL VALUE $	ANNUAL COST $	#	TOTAL VALUE $	ANNUAL COST $
Cows	286	91	26,026	2,343	82	23,452	2,111	55	15,730	1,416
Bulls	603	4	2,412	544	4	2,412	544	3	1,809	408
1st Replacement Heifers	250	15	3,750	338	14	3,500	315	9	2,250	203
2nd Replacement Heifers	286	14	4,004	360	13	3,718	335	8	2,288	206
Yearlings	250	25	6,250	328	22	5,500	289	15	3,750	197
Ewes	26	317	8,242	1,679	294	7,744	1,557	225	5,850	1,191
Bucks	58	10	580	265	10	580	265	7	406	185
Rep. Ewes	26	50	1,300	117	46	1,196	107	36	936	84
Horses										
1.Ranch Use	477	7			7			7		
2. Total	477	10	4,770	817	10	4,770	817	10	4,770	817
Total Annual Inventory Carrying & Depreciation Costs				6,791			6,340			4,707

GROSS REVENUE	UNITS	$/UNIT	PRESENT		25% REDUCTION		100% REDUCTION	
			# UNITS	TOTAL VALUES $	# UNITS	TOTAL VALUE $	# UNITS	TOTAL VALUE $
Cattle								
Calf Sales	head	178	61	10,858	54	9,612	37	6,586
Yearling Sales	head	355	25	8,875	22	7,810	15	5,325
Cull Cows	head	286	11	3,146	8	2,288	7	2,002
Cull Bulls	head	420	1	420	1	420	1	420
Sheep								
Lambs	head	41	357	14,637	331	13,571	253	10,373
1. Fats 75%								
2. Feeders 25%								
Cull Ewes		16	49	784	46	736	35	560
Cull Bucks		15	2	30	2	30	2	30
Wool Sales	lbs.	.76	2,926	2,224	2,724	2,070	1,894	1,439
Horse Sales	head	322	1	322	1	322	1	322
TOTAL GROSS REVENUE				$ 41,296		$ 36,859		$ 27,057
Total Operating Expenses				- 29,039		- 31,994		- 26,238
Total Annual Livestock Inventory Carrying & Depreciation Costs				- 6,791		- 6,340		- 4,707
NET REVENUE (Direct Ranch Income)				$ 5,466		$- 1,475		$- 3,888

NOTE: Prices have been normalized by considering a 5 year base (1974-1978) and weighing that base according to trends. Rounding to the nearest dollar has been done wherever possible to aid in the display of costs, prices, and revenues.

1/ Calculated at a rate of 9% for six months.

2/ Hired labor man years and costs are an aggregation of manager, seasonal, temporary, and annual employment.

3/ The price for lambs is prorated from a composition of 75% fats and 25% feeders.

FIGURE A12-6

RANCH BUDGET MODEL 6

CATTLE 221 to 1300
SHEEP 650 to 5400

OPERATING EXPENSE	UNIT	RATE $/UNIT	PRESENT		25% REDUCTION		100% REDUCTION	
			# of UNITS	TOTAL EXPENSE	# of UNITS	TOTAL EXPENSE	# of UNITS	TOTAL EXPENSE
Taxes				$ 8,221		$ 8,221		$ 8,221
Marketing Expense				3,187		3,187		3,187
Ranch Business				4,500		4,500		4,500
Interest on Production[1/]				7,647		7,626		7,506
General Supplies				9,333		9,333		9,333
Utilities				1,667		1,667		1,667
Veterinary				4,925		4,925		4,925
Insurance				9,400		9,400		9,400
Equipment Rental				667		667		667
Fuel-Lube				9,333		9,333		9,333
Shearing				2,081		2,081		2,081
Water Assessment				3,800		3,800		3,800
Fence-Building Repair				1,200		1,200		1,200
Machine-Equip. Repair				8,600		8,600		8,600
Custom Hire				8,400		8,400		8,400
Fertilizer-Chemical				6,667		6,667		6,667
Seed				233		233		233
Feed Purchases								
1. Alfalfa	ton	58	100.2	5,812	103.8	6,020	124	7,192
2. Hay	ton	58						
3. Grain	bushel	1.90						
4. Supplement	ton							
5. Salt	ton	73						
Trucking				6,121		6,121		6,121
Labor								
1. Hired[2/]	man years		5.17	29,050	5.17	29,050	5.17	29,050
2. Operator	man years		1.00		1.00		1.00	
3. Family	man years		2.00		2.00		2.00	
Land Leases								
1. Range	AUM	6.38	226	1,442	226	1,442	226	1,442
2. Irr. Pasture	AUM							
3. Hay	acres							
4. Alfalfa	acres							
5. Grain	acres							
Grazing Fees								
1. Forest Service	AUM	1.60	1,688	2,701	1,688	2,701	1,688	2,701
2. BLM	AUM	1.51	1,780	2,688	1,333	2,013	0	0
3. State	AUM							
Federal Land Expenses								
1. Grazing Assoc. Fees				0		0		0
2. Maintenance Costs				3,667		3,667		1,834
Yearling Calf Purchase	head	167	217	36,239	217	36,239	217	36,239
TOTAL				$177,581		$177,093		$174,299

LIVESTOCK INVENTORY	VALUE/ HEAD $	PRESENT			25% REDUCTION			100% REDUCTION		
		#	TOTAL VALUE $	ANNUAL COST $	#	TOTAL VALUE $	ANNUAL COST $	#	TOTAL VALUE $	ANNUAL COST $
Cows	286	60	17,160	1,545	Same as Present			Same as Present		
Bulls	603	3	1,809	408						
1st Replacement Heifers	250	10	2,500	225						
2nd Replacement Heifers	286	9	2,574	232						
Yearlings	250	0	0	0						
Purchased Yearlings	246	217	53,382	2,858						
Ewes	26	3,220	83,720	17,051						
Bucks	58	101	5,858	2,675						
Rep. Ewes	26	497	12,922	1,161						
Horses										
1.Ranch Use	477	19	9,063	1,552						
2. Total	477	19	9,063	1,552						
Total Annual Inventory Carrying & Depreciation Costs				27,707			27,707			27,707

GROSS REVENUE	UNITS	$/ UNIT	PRESENT		25% REDUCTION		100% REDUCTION	
			# UNITS	TOTAL VALUES $	# UNITS	TOTAL VALUE $	# UNITS	TOTAL VALUE $
Cattle								
Calf Sales	head	178	43	7,654	Same as Present		Same as Present	
Yearling Sales	head	355	217	77,035				
Cull Cows	head	286	8	2,144				
Cull Bulls	head	420	1	420				
Sheep								
Lambs	head	41	3,619	148,379				
Cull Ewes		16	497	7,952				
Cull Bucks		15	20	300				
Wool Sales	lbs.	.76	30,128	22,897				
Horse Sales	head	322	2	644				
TOTAL GROSS REVENUE				$267,425		$267,425		$267,425
Total Operating Expenses				-177,581		-177,093		-174,299
Total Annual Livestock Inventory Carrying & Depreciation Costs				- 27,707		- 27,707		- 27,707
NET REVENUE (Direct Ranch Income)				$ 62,137		$ 62,625		$ 65,419

NOTE: Prices have been normalized by considering a 5 year base (1974-1978) and weighing that base according to trends. Rounding to the nearest dollar has been done wherever possible to aid in the display of costs, prices, and revenues.

[1/] Calculated at a rate of 9% for six months.

[2/] Hired labor man years and costs are an aggregation of manager, seasonal, temporary, and annual employment.

[3/] The price for lambs is prorated from a composition of 75% fats and 25% feeders.

FIGURE A12-7

RANCH BUDGET MODEL 7

SHEEP 500 to 1249

OPERATING EXPENSE	UNIT	RATE $/UNIT	PRESENT		25% REDUCTION		100% REDUCTION	
			# of Units	TOTAL EXPENSE	# of UNITS	TOTAL EXPENSE	# of UNITS	TOTAL EXPENSE
Taxes				$ 3,267		$ 3,258		$ 3,232
Marketing				400		359		233
Ranch Business				300		300		300
Interest on Production1/				1,469		1,368		1,189
General Supplies				4,000		4,000		4,000
Utilities				800		800		800
Veterinary				400		359		233
Insurance				800		800		800
Equipment Rental				67		67		67
Fuel-Lube				4,133		4,133		4,133
Shearing				944		842		543
Water Assessment				1,400		1,400		1,400
Fence-Building Repair				560		560		560
Machine-Equip. Repair				1,450		1,450		1,450
Custom Hire				767		767		767
Fertilizer-Chemical				250		250		250
Seed				133		133		133
Feed Purchases								
1. Alfalfa	ton	58	7	406	7	406	7	406
2. Hay	ton							
3. Grain	bushel	1.90	256	486	256	486	256	486
4. Supplement	ton	154						
5. Salt	ton	73	1.7	124	1.5	110	1.0	73
Trucking				1,083		954		627
Labor								
1. Hired2/	man years		1.22	6,828	1.09	6,077	.71	3,950
2. Operator	man years		1.00		.89		.58	
3. Family	man years		1.33		1.18		.77	
Land Leases								
1. Range	AUM	6.38						
2. Irr. Pasture	AUM	6.38	3	20	3	20	3	20
3. Hay	acre	37						
4. Alfalfa	acres	44						
5. Grain	acres	44						
6. Row Crop	acres	44						
7. Aftermath	AUM	6.82	131	839	131	839	0	0
Grazing Fees								
1. Forest Service	AUM	1.60	630	1,008	630	1,008	630	1,008
2. BLM	AUM	1.51	241	364	179	270	0	0
3. State	AUM	3.11	0	0	0	0	0	0
Federal Land Expenses								
1. Grazing Assoc. Fees				0		0		0
2. Maintenance Costs				1,000		1,000		500
Ram Lease	head	35	23	805	20	700	13	455
Yearling Calf Purchase	head	167						
TOTAL				$ 34,103		$ 32,726		$ 27,615

LIVESTOCK INVENTORY	VALUE/ HEAD $	PRESENT			25% REDUCTION			100% REDUCTION		
		#	TOTAL VALUE $	ANNUAL COST $	#	TOTAL VALUE $	ANNUAL COST $	#	TOTAL VALUE $	ANNUAL COST $
Cows	286									
Bulls	603									
1st Replacement Heifers	250									
2nd Replacement Heifers	286									
Yearlings	250									
Purchased Yearlings	246									
Ewes	26	764	19,864	4,046	681	17,706	3,606	440	11,440	2,330
Bucks	58	3	174	79	3	174	79	2	116	53
Replacement Ewes	26	118	3,068	276	106	2,756	248	68	1,768	159
Horses										
1. Ranch Use	477	8			8			8		
2. Total Horses	477	8	3,816	653	8	3,816	653	8	3,816	653
Total Annual Inventory Carrying & Depreciation Costs				$ 5,054			$ 4,586			$ 3,195

GROSS REVENUE	UNITS	$/ UNIT	PRESENT		25% REDUCTION		100% REDUCTION	
			# UNITS	TOTAL VALUES $	# UNITS	TOTAL VALUE $	# UNITS	TOTAL VALUE $
Cattle								
Calf Sales	head							
Yearling Sales	head							
Cull Cows	head							
Cull Bulls	head							
Sheep								
Lambs3/	head	41	838	34,358	747	30,627	482	19,762
Cull Ewes	head	16	118	1,888	106	1,696	68	1,088
Cull Bucks	head	15	1	15	0	0	0	0
Wool Sales	lbs.	.76	6,385	4,853	5,699	4,331	3,676	2,794
Horse Sales	head	322	1	322	1	322	1	322
TOTAL GROSS REVENUE				$41,436		$36,976		$23,966
Total Operating Expenses				-34,103		-32,726		-27,615
Total Annual Livestock Inventory Carrying & Depreciation Costs				- 5,054		- 4,586		- 3,195
NET REVENUE (Direct Ranch Income)				$ 2,279		$- 336		$- 6,844

NOTE: Prices have been normalized by considering a 5 year base (1974-1978) and weighing that base according to trends. Rounding to the nearest dollar has been done wherever possible to aid in the display of costs, prices, and revenues.

1/ Calculated at a rate of 9% for six months.

2/ Hired labor man years and costs are an aggregation of manager, seasonal, temporary, and annual employment.

3/ The price for lambs is prorated from a composition of 75% fats and 25% feeders.

FIGURE A12-8

RANCH BUDGET MODEL 8

SHEEP 1250 to GREATER

OPERATING EXPENSE	UNIT	RATE $/UNIT	PRESENT		25%	REDUCTION	100%	REDUCTION
			# of UNITS	TOTAL EXPENSE	# of UNITS	TOTAL EXPENSE	# of UNITS	TOTAL EXPENSE
Taxes				$ 6,007		$ 6,007		$ 5,810
Marketing				1,123		1,123		264
Ranch Business				2,650		2,650		2,650
Interest on Production[1]				3,624		3,624		2,039
General Supplies				4,175		4,175		4,175
Utilities				1,775		1,775		1,775
Veterinary				1,991		1,991		469
Insurance				2,200		2,200		2,200
Equipment Rental				700		700		700
Fuel-Lube				5,750		5,750		5,750
Shearing				3,000		3,000		702
Water Assessment				1,250		1,250		1,250
Fence-Building Repair				1,303		1,303		1,303
Machine-Equip. Repair				3,950		3,950		3,950
Custom Hire				450		450		450
Fertilizer-Chemical				4,050		4,050		4,050
Seed				67		67		67
Feed Purchases								
1. Alfalfa	ton		151	8,758	1517	8,758	14.3	829
2. Hay	ton							
3. Grain	bushel							
4. Supplement	ton							
5. Salt	ton		7.5	548	7.5	548	1.8	131
Trucking				7,025		7,923		1,644
Labor								
1. Hired[2]	man years		3.14	18,759	3.14	18,759	.73	4,389
2. Operator	man years		1.00		1.00		.23	
3. Family	man years		1.50		1.50		.35	
Land Leases								
1. Range	AUM							
2. Irr. Pasture	AUM							
3. Hay	acre							
4. Alfalfa	acres							
5. Grain	acres							
6. Row Crop	acres							
7. Aftermath	AUM							
Grazing Fees								
1. Forest Service	AUM	1.60	1,632	2,611	1,632	2,611	1,632	2,611
2. BLM	AUM	1.51	1,197	1,807	896	1,353	0	0
3. State	AUM	3.11	0	0	0	0	0	0
Federal Land Expenses								
1. Grazing Assoc. Fees				0		0		0
2. Maintenance Costs				300		300		150
Ram Lease	head	35	8	280	8	280	0	0
TOTAL				$ 84,153		$ 84,597		$ 47,358

LIVESTOCK INVENTORY	VALUE/ HEAD $	PRESENT			25%	REDUCTION		100%	REDUCTION	
		#	TOTAL VALUE $	ANNUAL COST $	#	TOTAL VALUE $	ANNUAL COST $	#	TOTAL VALUE $	ANNUAL COST $
Ewes	26	2,145	55,770	11,358	2,145	55,770	11,358	502	13,052	2,658
Bucks	58	63	3,654	1,668	63	3,654	1,688	15	870	397
Replacement Ewes	26	331	8,606	773	331	8,606	773	77	2,002	180
Horses										
1. Ranch Use	477	13			13			7		
2. Total Horses	477	13	6,201	1,062	13	6,201	1,062	7	3,339	572
Total Annual Inventory Carrying & Depreciation Costs				14,861			14,861			3,807

GROSS REVENUE	UNITS	$/ UNIT	PRESENT		25%	REDUCTION	100%	REDUCTION
			# UNITS	TOTAL VALUES $	# UNITS	TOTAL VALUE $	# UNITS	TOTAL VALUE $
Sheep								
Lambs[3]	head	41	2,175	89,175	2,175	89,175	509	20,869
Cull Ewes	head	16	334	5,344	334	5,344	78	1,248
Cull Bucks	head	15	10	150	10	150	3	45
Wool Sales	lbs.	.76	19,749	15,009	19,749	15,009	4,624	3,514
Horse Sales	head	322	1	322	1	322	1	322
TOTAL GROSS REVENUE				$110,000		$110,000		$25,998
Total Operating Expenses				- 84,153		- 84,597		-47,358
Total Annual Livestock Inventory Carrying & Depreciation Costs				- 14,861		- 14,861		- 3,807
NET REVENUE (Direct Ranch Income)				$ 10,986		$ 10,542		$-25,167

NOTE: Prices have been normalized by considering a 5 year base (1974-1978) and weighing that base according to trends. Rounding to the nearest dollar has been done wherever possible to aid in the display of costs, prices, and revenues.

[1] Calculated at a rate of 9% for six months.

[2] Hired labor man years and costs are an aggregation of manager, seasonal, temporary, and annual employment.

[3] The price for lambs is prorated from a composition of 75% fats and 25% feeders.

TABLE A-12-1

FEDERAL/STATE FORAGE AS PERCENTAGE OF TOTAL FORAGE, BY FORAGE SEASON

REGION			FORAGE SEASONS			
SOUTHWEST			1	2	3	4
Model 1	Cattle	FS	0.0%	28.6%	0.0%	0.0%
		BLM	3.5	1.9	0.0	0.0
		STATE	0.0	0.0	0.0	0.0
		TOTAL	3.5	30.5	0.8	0.0
Model 2	Cattle	FS	12.2	77.8	8.5	0.0
		BLM	28.9	0.0	9.3	5.3
		STATE	0.0	0.0	0.0	0.0
		TOTAL	41.1	77.8	17.8	5.3
Model 3	Cattle	FS	11.7	50.9	5.2	0.0
		BLM	24.7	10.9	11.8	18.8
		STATE	0.0	0.2	0.0	0.0
		TOTAL	36.4	62.0	17.0	18.8
Model 4	Cattle	FS	2.6	16.5	0.2	0.0
		BLM	14.5	3.5	3.1	11.0
		STATE	1.3	0.4	0.09	1.6
		TOTAL	18.4	20.4	3.4	12.6
Model 5	Both	FS	4.2	20.7	0.7	0.0
		BLM	30.3	13.5	37.7	15.7
		STATE	6.2	6.4	5.6	30.5
		TOTAL	40.7	40.6	44.0	46.2
Model 6	Both	FS	5.7	37.1	3.0	0.0
		BLM	7.0	12.1	6.2	11.3
		STATE	0.0	0.0	0.0	0.0
		TOTAL	12.7	49.2	9.2	11.3
Model 7	Sheep	FS	4.1	90.5	7.1	0.0
		BLM	65.8	1.3	40.3	56.7
		STATE	0.0	0.0	0.0	0.0
		TOTAL	69.9	91.8	47.4	56.7
Model 8	Sheep	FS	6.6	69.1	4.2	0.0
		BLM	69.0	8.3	0.9	1.5
		STATE	0.0	0.0	9.4	8.2
		TOTAL	75.6	77.4	14.5	9.7
REGIONAL AVERAGE:			37.3	56.2	9.3	20.1
STATE AVERAGE:			24.8	56.9	14.2	17.4

was adjusted to compensate for the net forage use changes. The herd size adjustments are indicated in the ranch budgets and become the source of gross and net revenue changes associated with the BLM forage use changes.

The ranch budgets for the eight models follow (figures A12-1 through A12-8). Certain operating expense items such as ranch business, utilities, and water assessment were judged to be relatively fixed, and thus were not varied between the three levels of BLM forage use. Other expense items such as marketing, veterinary, and shearing were varied to compensate for the various herd sizes.

The present for each of the models was used to estimate revenue levels per ranch and in aggregate, given existing BLM forage use levels for the 138 ranches. This information is displayed in table 2-19.

The 100 percent reduction of BLM forage use for each model was used to make the revenue estimates displayed in table 8-14 for the elimination of BLM grazing alternative (alternative C).

The 25 percent reduction for each model was used to make the revenue estimates for the proposed action and alternatives B, D, E, and F. The study models indicate a linear relationship between forage use changes and revenues within ranges of forage use changes indicated for the above scenarios. Because of this linear relationship a 25 percent BLM forage use reduction was considered to be a good representative reduction level from which to assess revenue impacts. Income indexes were developed for each model to estimate gross and net revenue changes per AUM change of forage use. These indexes per AUM use change were then applied to the average AUM reductions per ranch for the above forage use reduction scenarios to make revenue estimates. The indexes are displayed in table A12-2.

Table A12-3 indicates the estimated reduction in local property taxes that would be paid per ranch and in total if livestock grazing on BLM lands were eliminated. This estimated local property tax reduction was prorated to the proposed action and alternatives B, D, E, and F based on the percentage the respective reductions are of the 100 percent reduction. Thus, an estimated of local property tax reductions based on changing values of ranch livestock herds was made and included in the document wherever appropriate.

A method similar to the above was used to estimate changes in hired employment. Table A12-4 indicated the reduction in man years of hired employment per ranch and in total as a result of elimination of livestock grazing on BLM lands. The total reduction was then prorated to the proposed action and other alternatives to make man year employment reduction estimates.

As stated in chapter 1 of this document, all analysis is based on active use qualifications. It is possible that actual forage use on allotment may vary as much as 10 percent below the present use levels indicated. Consequently, the economic impacts identified by the use of the eight ranch models may be viewed as maximum impacts that could be expected from implementation of the proposed action or alternatives.

Individual ES area ranches may not exactly match the budget displays for the ranch models. However, since the models are averages for the survey ranches falling into the respective categories, the models should on the average accurately estimate economic impacts on ES area ranching operations.

TABLE A-12-2

GROSS AND NET REVENUE INDEXES

Model	Gross Revenue/AUM Income Index ($)[1]	Net Revenue/AUM Income Index ($)[2]
1	58.87	15.50
2	44.52	17.83
3	60.57	23.98
4	63.41	23.85
5	27.73	43.38
6	0.00[4]	(-) 1.09[3]
7	71.94	42.18
8	0.00[4]	1.48

[1] Present Gross Revenue - 25% Reduction Gross Revenue - AUM reductions per ranch = Index.

[2] Present Net Revenue - 25% Reduction Net Revenue - AUM reductions per ranch = Index.

[3] The inverse relationship between forage use change and net revenue exists in this case because the survey ranches making up this model had the capability of substituting private forage to maintain herd size and operating expense increases did not outweigh decreases.

[4] In both of these cases involving large sheep herds, no change in herd size occurred, consequently gross revenue did not change.

TABLE A-12-3

LOCAL PROPERTY TAX CHANGE

Model	Number of Ranches	Tax Decrease Per Ranch ($)	Total Tax Decrease All Ranches ($)
1	70	92	6,440
2	26	234	6,084
3	11	469	5,159
4	14	736	10,304
5	6	73	438
6	5	0	0
7	3	35	105
8	3	197	591
Total	138		29,121

NOTE: This change represents the difference between local property taxes presently paid and the amount by which those taxes revenues would be reduced if BLM grazing were eliminated. The change is determined by assessing the changes in ranch herd values at 5% and then applying the 1977 mill levy for Mesa County (71.76 mills) to the assessment changes.

TABLE A-12-4

HIRED RANCH EMPLOYMENT

Model	Number of Ranches	Employment Reduction per Ranch	Employment Reduction All Ranches
1	70	.16	11.20
2	26	.48	12.48
3	11	1.61	17.71
4	14	1.39	19.46
5	6	.09	.54
6	5	0.00	0.00
7	3	.51	1.53
8	3	2.41	7.23
Total	138		70.15

NOTE: Employment is measured in man years. The estimates displayed represent the difference between present levels of hired ranch employment and those levels expected to exist with elimination of livestock grazing on BLM lands.

GLOSSARY

GLOSSARY

ACRE-FOOT. A unit for measuring volume, equal to the quantity of water or other material required to cover one acre to a depth of one foot or a volume of 43,560 cubic feet.

ADVERSE VISUAL IMPACT. Any impact on the land or water form, vegetation, or any introduction of a structure which adversely changes or interrupts the visual character of the landscape and disrupts the harmony of the natural elements.

AESTHETICS. Dealing with the nature of the beautiful and with judgments concerning beauty.

ALLOTMENT. An area of land where one or more operators graze their livestock. It generally consists of public lands but may include parcels of private or state owned lands. The number of livestock and season of use are stipulated for each allotment. An allotment may consist of several pastures or be only one pasture.

ALLOTMENT MANAGEMENT PLAN (AMP). A concisely written program of livestock grazing management, including supportive measures, if required, designed to attain specific management goals in a grazing allotment.

ALLOTTEE. Holder of a license or permit for grazing on an allotment. A permittee.

ALLUVIUM. Unconsolidated rock or soil material deposited by running water, including gravel, sand, silt, clay and various mixtures of these.

ALLUVIAL FAN. A body of alluvium whose surface forms a segment of a cone that radiates downslope from the point where the stream emerges from a narrow valley onto a plain.

ALLUVIAL SOIL. A soil developing from recently deposited alluvium and exhibiting essentially no horizon developoment or modification of the recently deposited materials.

ANGLE OF SOIL REPOSE. The deviation from horizontal at which the gravitational movement slows sufficiently for rooted plant growth.

ANIMAL UNIT MONTH (AUM). The forage needed to support one cow, one horse, or five sheep for a month or one elk, five deer, or five antelope for the same period of time (1800 lbs./AUM on a 40 percent utilization basis).

ANNUALS. Plants produced from seed which complete their life cycle in one growing season.

AQMA. Air Quality Maintenance Area.

AQUIFER. A water-bearing bed or stratum of permeable rock, sand or gravel capable of yielding considerable quantities of water.

ARCHAIC (CULTURAL RESOURCES). Relating to, belonging or having the characteristics of an earlier, or a more primitive time.

ARCHEOLOGICAL RESOURCES. Sites, areas, structures, objects, or other evidence of prehistoric human activities.

ASPECT. The orientation of a slope in respect to the compass; a position facing or fronting a particular direction.

ASPECT (VEGETATIVE). The appearance that a dominant or most common species of vegetation gives to the viewer, i.e., shortgrass, pinyon-juniper, big sagebrush, see vegetation type.

AUM. See Animal Unit Month.

AVERAGE ANNUAL PRECIPITATION. An average of the yearly precipitation usually expressed in inches of water that fall or are computed to fall at a point or on an area during a specified number of calendar or water years.

BACKGROUND. The area of a distance zone which lies beyond the foreground-middleground. Usually from a minimum of 3 to 5 miles to a maximuum of about 15 miles from a travel route, use area or other observer position. Atmospheric conditions in some areas may limit the maximum to about 8 miles or increase it beyond 15 miles.

BASAL AREA. That area of ground covered by the primary stem of a plant or tree, usually expressed in square feet.

BASIC ELEMENTS. The four major elements (form, line, color, and texture) which determine how the character of a landscape is perceived.

BIOMASS. The weight of all (or the specified) living organisms over a unit of area.

BROWSE. The part of leaf and twig growth of shrubs, woody vines, and trees available for animal consumption.

CATCHMENT. A structure built to collect and retain water.

CARRYING CAPACITY. A maximum number of animals that can survive on a land area over a long term.

CFR. Code of Federal Regulations

CHARACTERISTIC LANDSCAPE. The established landscape within an area being viewed. This does not necessarily mean a naturalistic character. It could refer to a farming community, an urban landscape, a primarily natural environment, or other landscape which has an identifiable character.

CHECK DAM. Man-made structure which will slow down or temporarily stop runoff. Check dams reduce water velocity and channel erosion and cause sediment deposition in the channels above the structures.

COLOR. Color is a phenomenon of light or visual perception that enables one to distinguish between otherwise identical objects, a hue, as contrasted with black, white, or gray. Color as perceived in the landscape is usually most prominent in the vegetation, but may be expressed in the soil, rocks, water, etc., and may vary with the time of day, time of year, and the weather.

CONTRAST. The effect of a striking difference in the form, line, color, or texture of the landscape features within the area being viewed.

CONTRAST RATING A method of determining the extent of visual impact for an existing or proposed activity that will modify any landscape feature (land and water form, vegetation, and structures).

CONVECTIONAL THUNDERSTORMS. Storms that occur in the summer when the land surface becomes very hot under strong insolation and the lower strata of the atmosphere, in turn, heated considerably. Cumulus clouds are the upper ends of columns of overturned air formed by warm air rising to altitudes where it is chilled to the point of condensation. This phenomenon results in rains of high intensity, short duration and local distribution, usually accompanied by lightning (R.F. Daubenmire).

COMPETITION. Two or more organisms or species sustaining damage due to a limited resource mutually required.

COOL-SEASON GRASS. A grass which makes the major portion of its growth during late winter, early spring, and again in the fall (during the cool seasons) or at higher elevations during the summer.

CRITICAL VIEWPOINT. The point(s) commmonly in use or potentially in use where the view of a management activity is the most disclosing.

CRITICAL WILDLIFE HABITAT. That portion of the living area of a wildlife species that is essential to the survival and perpetuation of the species either as individuals or as a population.

CULTURAL MODIFICATION. Any man-caused change in the land or water form or vegetation or the addition of a structure which creates a visual contrast in the basic elements (form, line, color, texture) of the naturalistic character of a landscape.

CULTURAL RESOURCES. Those fragile and nonrenewable remains of human activity, occupation, or endeavor, reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features, that were of importance in human events.

CULTURAL STAGE. The term "culture" usually refers to single technologies or assemblages reflecting a similar economic adjustment shared by a large number of social groups. In "stage" there is an additional connotation of sequence and ranking of cultures by level or complexity toward some terminal or final level.

CYCLONIC OR FRONTAL STORMS. Storms that are caused by eddies of warm air several hundred miles in diameter; rising in vertical spirals about centers of low atmospheric pressure. As the ascending mass of air in a cyclone rises, it expands, mingles with cold air and thereby, is greatly cooled. Precipitation results from this action and storms of this type are usually of long duration.

DEFERRED GRAZING. Withholding of livestock grazing until a certain stage of plant growth is reached, usually maturity of seed.

DEFERRED-ROTATION GRAZING. A system of grazing which delays grazing in succeeding years on a portion of the range until a specific plant growth stage is reached. The entire range is used at sometime during the grazing season.

DETRITIVORES. Organisms, usually small to microscopic, which subsist on dead organisms; decomposition agents, saprotrophic organisms.

DISSOLVED SOLIDS. Solids that originate mostly from rocks and are in solution. Some colloidal material is treated as if it were in solution in determining dissolved solids. The total dissolved mineral constituents of water.

EASEMENT. An easement is a right acquired by the U.S. to use or control private property for a road, trail or other specified purposes.

ECOSYSTEM. A community, including all the component organisms, together with the environment, forming an interacting system.

EDGE EFFECT. An area where the types of food and cover are more diverse thus creating a more favorable wildlife habitat, i.e., meadow abutting forest or logged area adjacent to or surrounded by "natural" vegetation.

ENDANGERED SPECIES. Any species which is in danger of extinction throughout all or a significant portion of its ranges.

ENVIRONMENTAL ANALYSIS RECORD (EAR). A report analyzing the impacts of some proposed action on a given environment. It is similar to an environmental statement (ES) except that is is generally smaller in scope and makes recommendations for action. EARs are sometimes preliminary to ESs.

EROSION. The process by which soil particles are detached and moved.

EROSION CONDITION CLASS. A classification system for soil erosion which allows a site to be ranked on a scale of 0-100, in increments of 20 points. Value classes are: 0-20 = stable; 21-40 = slight; 41-60 = moderate; 61-80 = critical; 81-100 = severe. The terms used for value classes are largely self-explanatory.

FALLER. In the logging industry, a term used to describe a person who cuts trees down.

FAUNA. All animals of a particular period or region, taken collectively.

FLOODPLAIN. The nearly level alluvial plain that borders a stream and is subject to inundation during high water.

FLORA. All plant life of a particular period or region.

FLOW PATTERN. A microchannel(s) collecting and/or redistributing water resulting from precipitation events; a flow pattern is smaller than a rill.

FORB. Herbaceous plants neither grass nor resembling grass.

FOREGROUND-MIDDLEGROUND. The area visible from a travel route, use area, or other observer position to a distance of 3 to 5 miles. The outer boundary of this zone is defined as the point where the texture and form of individual plants are no longer apparent in the landscape. Vegetation is apparent only in patterns or outline.

FORM. Form is generally considered as the mass or shape of an object. It is most strongly expressed in the shape of the land surface, usually the result of some type of erosion, but may also be reflected in the shape of the openings or changes in vegetation, or in the structures placed on the landscape.

FREMONT CULTURE. Prehistoric Indians who inhabited portions of Western Colorado and Eastern Utah.

GRAZEABLE. The adjective of an area or areas suitable for grazing based upon the presence of forage and its accessibility to the kinds of animals under consideration.

GROUND COVER(SOIL). The material covering the soil and providing protection from, or resistance to, the impact of raindrops, and expressed in percent of the area covered. Composed of vegetation, litter, erosion pavement and rock.

GROUND COVER (VEGETATION). Vegetative ground cover is living vegetation which covers a point on the ground surface, when viewed from directly overhead, including canopies of trees and shrubs within 20 feet or less of the ground surface and lichens and mosses 1/16 inch or more in thickness.

GROUND WATER. That part of subsurface water that completely saturates the rocks and is under hydrostatic pressure.

GROWING POINTS. The area of rapidly dividing cells at the tip of a stem or branch, also called meristem.

GULLY. A channel cut by concentrated runoff through which water commonly flows during or immediately after heavy rains or during the melting of snow. A gully must have a depth in excess of 6 inches.

HABITAT. A specific set of physical conditions that surround the single species, a group of species, or a large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and living space.

HERBICIDE. A non-hardware substance used to destroy plants.

HIGH DENSITY-LOW FREQUENCY (GRAZING). Grazing an area with a greater number of animals for a shorter period of the year relative to the previous practice.

HIGH-INTENSITY STORMS. Storms producing rainfall at rates exceeding the ability of the ground surface to absorb the water, thus resulting in the runoff of water. These storms are usually the convective, or thunderstorm, type.

HISTORICAL RESOURCES. All evidences of human activity that date from historic (i.e., recorded history) periods.

HYDROCARBON. Any of numerous organic compounds, such as benzene and methane, that contain only carbon and hydrogen.

INCREASERS. Plants which increase as the vegetational composition deteriorates.

INFILTRATION. The downward entry of water into the soil.

INTRUSION. A feature (land and water form, vegetation, or structure) which is generally considered out of context with the characteristic landscape.

INVADERS. Plants which invade or occupy open space resulting from the loss of other longer lived plants.

INVERTEBRATE. An animal without a backbone. This group includes such animals as insects, clams, snails, and worms.

ISOHYET. A line along which at any point mean annual precipitation is the same. Mean annual precipitation is greater on one side and less on the other side of this line. A mappable concept.

LANDSCAPE FEATURES. The land and water form, vegetation, and structures which compose the characteristic landscape.

LEACHING. The removal of materials in solution from the soil.

LINE. Lines found in the natural landscape are usually the result of an abrupt contrast in form, texture, or color. Lines may be found as ridges, skylines, structures, changes in vegetative types, or individual trees and branches.

LITHIC SCATTER. Stone debris left as the result of tool manufacture or reshaping.

LITTER. The uppermost layer of undecomposed, organic debris on or near the soil surface.

MANAGEMENT FRAMEWORK PLAN (MFP). Land use plan for public lands which provides a set of goals, objectives, and constraints for a specific planning area to guide the development of detailed plans for the management of each resource.

MESA. A broad, nearly flat-topped and usually isolated upland mass.

METEOROLOGY. The science dealing with the phenomena of the atmosphere, especially weather and weather conditions.

MICROHABITAT. The smallest unit of a habitat, as in a clump of grass or between rocks.

NAAQS. National Ambient Air Quality Standards.

NATALITY. Number of births per unit of area, time and population; birth-rate.

NATIONAL REGISTER OF HISTORIC PLACES. The official list, established by the Historic Preservation Act of 1966, of the nation's cultural resources worthy of preservation.

NATIONAL REGISTER PROPERTY. Means a district, site building structure or object included in the National Register.

NATURAL REPRODUCING POPULATION. A group of interacting and interbreeding individuals that has relatively little reproductive contact with other groups of the same species, and which reproduces independent of human manipulation.

OFF-ROAD VEHICLE (ORV). An "off-road vehicle" is any motorized vehicle capable of or designed for, travel on or immediately over land, water, or other natural terrain excluding (1) any nonamphibious registered motorboat; (2) any military, fire, emergency, or law enforcement vehicle while being used for emergency purposes; (3) any vehicle whose use is specifically authorized by the authorized officer or otherwise officially approved; (4) official use; or (5) any combat or combat support vehicle when used in times of natural defense emergencies.

OUTDOOR RECREATION OPPORTUNITIES (ACTIVITIES). A general categorization of leisure pursuits which occur in the outdoors.

OUTWASH PLAIN. An extensive lowland area forming the surface of a body of coarse textured, glaciofluvial material.

OVERSTORY. That portion of a plant community that is dominant as to height, the tallest plants on a given site.

OZONE. A blue gaseous allotrope of oxygen, 0_3, derived or formed naturally from diatonic oxygen by electric discharge or exposure to ultraviolet radiation. It is an unstable powerfully bleaching, poisonous, oxidizing agent.

PALEO-INDIAN. Cultural remains of human groups which coexisted with Pleistocene megafauna in North America.

PALEONTOLOGY. A science dealing with the life of past geological periods as known from fossil remains.

PARENT MATERIAL. The unconsolidated and more-or-less chemically weathered mineral or organic matter from which soil develops.

PASTURE. As used in this document, a pasture is a subdivision of a grazing allotment on public lands. For example, the allotment is divided into three pastures.

PEDESTALLING. A phenomenon of erosion where plants or rocks are left standing on pedestals of soil. Pedestals are formed because a rock or plant has held the soil underneath in place.

PEDIMENT. A gently sloping erosional surface developed at the foot of a receding hill or mountain slope.

PERCOLATION. Downward movement of water through soils.

PERMEABILITY. The ease with which gases, liquids, or plant roots penetrate or pass through a bulk mass of soil or a layer of soil.

PERMITTEE. Holder of a license or permit for grazing on an allotment. An Allottee.

PETROGLYPH. A figure, design, or indentation carved, abraded or pecked on a rock.

PHENOLOGY. The progress of plants through their growth cycle.

PHYSIOGRAPHIC REGION. An extensive portion of the landscape normally encompassing many hundreds of square miles which portrays similar qualities of soil, rock, slope, and vegetation of the same geomorphic origin.

PLANT COVER. The percent of an area covered by any part of living plant material (aerial plant cover), or that percent area occupied by the portion of living plants at the point of emergence from the ground (basal plant cover).

PLANT DENSITY. The number of vegetation individuals per unit of area. Refers to the relative closeness of individual vegetation to one another.

POROSITY. The volume percentage of the total bulk not occupied by solid particles.

PRECIPITATION. The discharge of water, in liquid or solid state, out of the atmosphere, generally upon land or water surface. The term is also used to designate the quantity of water that is precipitated.

PUBLIC LAND. Land administered by the Bureau of Land Management.

RANGE CONDITION AND TREND. A description of the current status and estimated future improvement or deterioration of the vegetation and soil.

RAPTOR. Birds of prey with sharp talons and strongly curved beaks; hawks, owls, vultures etc.

RECONNAISSANCE SOIL MAP. A map showing the distribution of soils over a large area as determined by traversing the area at intervals varying from about one-half mile to several miles.

RECREATION RESOURCES. Any resource or feature that contributes to outdoor leisure pursuits or experiences.

REGENERATION LAG. The period of time between the removal of plants from a site and their new establishment on the site.

RESIDUAL SOIL. A soil formed from, or resting on, consolidated rock of the same kind as that from which it was formed, and in the same location.

REST. Deferment of grazing on a range area to allow plants to replenish their food reserves. In this statement refers to year-long relief from livestock grazing.

REST ROTATION GRAZING. A system which rests the range from grazing at suitable intervals to counteract the harmful effects of selective grazing. The system allows the desirable forage species to recover vigor, produce seed, and reproduce. Often applied only to plans providing year-long rest to at least one portion of the range annually.

RILL. A small intermittent water course with steep sides, less than 6 inches deep.

RIPARIAN. Situated on or pertaining to the bank of a river, stream, or other body of water. Normally used to refer to the plants of all types that grow rooted in the watertable of streams, ponds, and springs, etc.

ROAD For the purpose of the wilderness inventory a road is defined as and must meet all of the following:

An access route which has been improved and maintained by using hand or power machinery or tools to insure relatively regular and continuous use. A way maintained solely by the passage of vehicles does not constitute a road.

Words and phrases used in the above definition of "road" are defined as:

Improved and maintained: Where actions have been and will continue to be directed to physically keep the road open to traffic.

Relatively regular and continuous use: Use by vehicles having four or more wheels which has occurred, and will continue to occur, on a recurring basis for a predetermined, planned, or intended purpose. An example would be access for equipment to maintain a stock water tank. Casual or random use by off-road vehicles or recreationists does not qualify.

ROADLESS AREA. That area bounded by a road using the edge of the physical change that creates the road or the inside edge of the right-of-way as a boundary.

ROCKSHELTER. Any natural shelter between or under standing rocks in which the debris and campfires of prehistoric people are found.

SCARCITY. A scenic resource which is very rare or unique within a region, or may be somewhat more common, but because of its distinguishing characteristics, is unusually memorable.

SCENIC QUALITY. The degree of harmony, contrast, and variety within a landscape.

SEDIMENT YIELD. The amount of sediment given up by a watershed over a specified time period, usually a year. Ordinarily, it is expressed as tons, acre feet, or cubic yards of sediment per unit of drainage area per year.

SELDOM SEEN. Portions of the landscape which are generally not visible from high and medium visual sensitivity level observer positions and that are visible beyond approximately 15 miles from those positions.

SELF MAINTAINING POPULATION. A population which does not require human manipulation for the various life phases of birth, growth, and reproduction in order to exist.

SENSITIVITY. As applied to visual resource management, that degree of concern expressed by the user toward scenic quality and existing or proposed visual change in a particular characteristic landscape.

SERAL. Pertaining to the successional stages of biotic communities.

SHEET EROISON. The removal of a fairly uniform layer of soil from the land surface by runoff water.

SILT. Sedimentary material consisting primarily of mineral particles intermediate in size between sand and clay.

SOIL ASSOCIATION. A mapping unit used on general soil maps, in which two or more defined taxonomic units occurring together in a characteristic pattern are combined because the scale of the map of the purpose for which it is being made does not require delineation of the individual soils.

SOIL ERODIBILITY FACTOR. The measure of the rate at which a soil will permit a high level of crop productivity to be sustained economically and indefinitely; also called permissable soil loss.

SOIL PRODUCTIVITY. The capability of a soil for producing a specified plant or sequence of plants under a specified system of management.

SOIL SERIES. The basic unit of soil classification being a subdivision of a family and consisting of soils which are essentially alike in all major profile characteristics except the texture of the surface horizon.

SOIL STABILIZATION. The process of making a soil resistant to detachment and movement by water, wind or gravity. Stabilization is usually associated with an establishment of a vegetative cover or the installation of erosion control structures.

SOIL STRUCTURE. The combination or arrangement of primary soil particles into secondary particles, units, or peds. These secondary units may be, but usually are not, arranged in the profile in such a manner as to give a distinctive characteristic pattern.

SOIL SURFACE FACTOR. A factor reflecting the present erosion activity on the ground surface. It is used to reflect the general condition of the area represented by an associated transect used in the determination of hydrologic condition for watershed cover.

STAND. An aggregation of trees or other growth occupying a specific area and sufficiently uniform in composition, (species), age, arrangement, and condition, to be distinguishable from the forest or other growth on adjoining areas.

SURFACE SOIL. The uppermost part of the soil, ordinarily moved in tillage, or its equivalent in uncultivated soils, and ranging in depth from 3 or 4 inches to 8 or 10 inches.

TERPENES. Unsaturated hydrocarbons, C_6H_{16} found in essential oils and oleoresins of plants.

TERRACE. A step-like surface bordering a valley floor or shoreline, that represents the former position of an alluvial plain, or lake or sea shore.

TEXTURE. Texture is the result of the size, shape, and placement of parts, their uniformity, and the distance from which they are being observed. Texture, as it is preceived in the landscape, is usually the result of the vegetation of vegetative patterns on the landsacpe. Texture may also be the result of the erosive patterns in rocks or soil.

THREATENED SPECIES. Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

TOPSOIL. Presumed fertile soil or soil material, usually rich in organic matter, used to top-dress road banks, parks, etc.

UNDERSTORY. That portion of a plant community that grows underneath taller plants growing on the same site.

UNGULATE. A hooved animal.

UNIT RESOURCE ANALYSIS. The system of data gathering and analysis that precedes land use planning for public lands. See *Management Framework Plan*.

VEGETATION TYPE. A plant community with immediately distinguishable characteristics, based upon and named after the apparent dominant plant species.

VERTEBRATE. An animal having a backbone or spinal column.

VIGOR (PLANTS). The state of health of a plant. The capacity of a plant to respond to growing conditions, to make and store food, produce food, produce seed, or reproduce vegetatively, that is, by stolons or rhizomes.

VISUAL RESOURCE. The land, water, vegetative, animal, and other features that are visible on all lands.

VISUAL RESOURCE MANAGEMENT (VRM). The planning, design, and implementation of management objectives to provide acceptable levels of visual impacts for all BLM resource management activities.

VISUAL RESOURCE MANAGEMENT CLASSES. The degree of visual change that is acceptable within the characteristic landscape. It is based upon the physical and sociological characteristics of any given homogeneous area and serves as a management objective.

VISUAL SENSITIVITY LEVEL(S). An index of the relative degree of user interest in scenic quality and concern for existing or proposed changes in the landscape features of that area in relation to other areas in the planning unit.

WARM SEASON GRASS. A plant which makes most, or all of its growth during the spring, summer or fall and is usually dormant in winter; grows during the warm season.

WICKIUP. A frame hut covered with matting, bark, or brush.

WILDERNESS AREA. An area formally designated by Congress as a part of the National Wilderness Preservation System.

WILDERNESS CHARACTERISTICS. The definition contained in section 2(c) of the Wilderness Act (78 Stat. 891).

WILDERNESS STUDY AREA. A roadless area which has been found to have wilderness characteristics (thus having the potential of being included in the National Wilderness System), and which will be subjected to intensive analysis in the Bureau's planning system, and public review to determine wilderness suitability, and is not yet the subject of a congressional decision regarding its designation as wilderness.

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☆GPO 1979-678-859

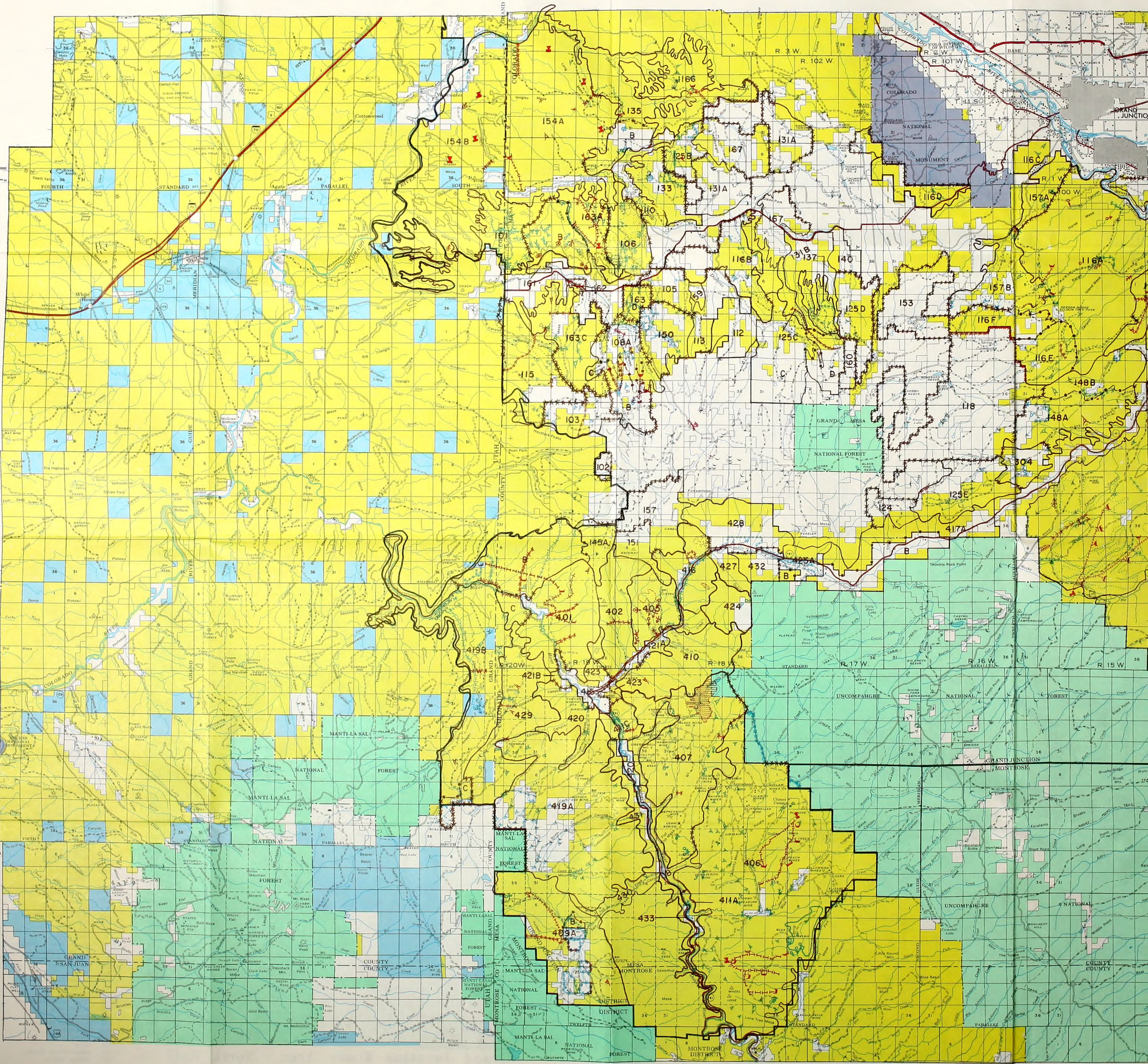
ERRATA (ES Study Area Map)

North Half

1. Legend, asterisk (*) should be followed by "Indicates Less Intensive Management Allotment"
2. Allotment #135, below 135 delete 136.
3. Allotment #705, brush beating is an existing project.
4. Allotment #713
   a. Missing proposed chaining and seeding project, 80 acres.
   b. Missing proposed brush beating project, 1030 acres.
   c. All pipelines are proposed.
5. Allotment #715, delete all brown hash marks (NE to SW lines).
6. Allotment #745, four areas are indicated for proposed vegetation manipulation. The most south-easterly and the most westerly ones are existing chaining areas.
7. Allotment #723, missing proposed brush beating project, 1,130 acres.
8. Allotment #'s 602 & 724, chaining and seeding symbol should be changed to brush beating symbol.

South Half

9. Legend.
   a. Pinon-Juniper Removal symbol should be removed.
   b. Brush beating symbol should be shown also in red (proposed).
10. Allotment #202 & #203,
    a. Boundaries missing
    b. Allotment numbers missing
    c. Existing facilities not shown
    d. #202, proposed are fence 5.3 mi., pipeline 8 mi., spring and cattleguard, 1 each.
    e. #203, proposed is chaining and seeding, 2,000 acres
11. Allotment #405, chaining and seeding symbol should be changed to thinning symbol.
12. Allotment #416, delete chaining and seeding.


GRAND JUNCTION
COLORADO NATIONAL MONUMENT
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R 102 W.
R 101 W.
R 2 W.
R 1 W.
R 100 W.
T 1 S.
154A
154B
135
166
131A
67
125B
133
163A
110
106
101
116B
137
140
116C
116D
157A
116A
157B
161
162
105
159
163
125D
153
116F
163C
108A
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113
112
125C
160
116E
115
118
148B
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102
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125E
417A
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151
428
425A
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432
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421A
419B
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433
GRAND MESA NATIONAL FOREST
UNCOMPAHGRE NATIONAL FOREST
MANTI-LA SAL NATIONAL FOREST
MANTI-LA SAL
NATIONAL
FOREST
UTAH
COLORADO
GRAND
MESA
MONTROSE
SAN JUAN
GRAND JUNCTION
MONTROSE
DISTRICT
MONTROSE DISTRICT
FOURTH STANDARD PARALLEL SOUTH
FIFTH STANDARD PARALLEL SOUTH
GRAND RIVER GUIDE MERIDIAN
COLORADO RIVER
DOLORES RIVER
GUNNISON RIVER
Cisco
Westwater
Dewey
Gateway
Whitehouse
R 20 W.
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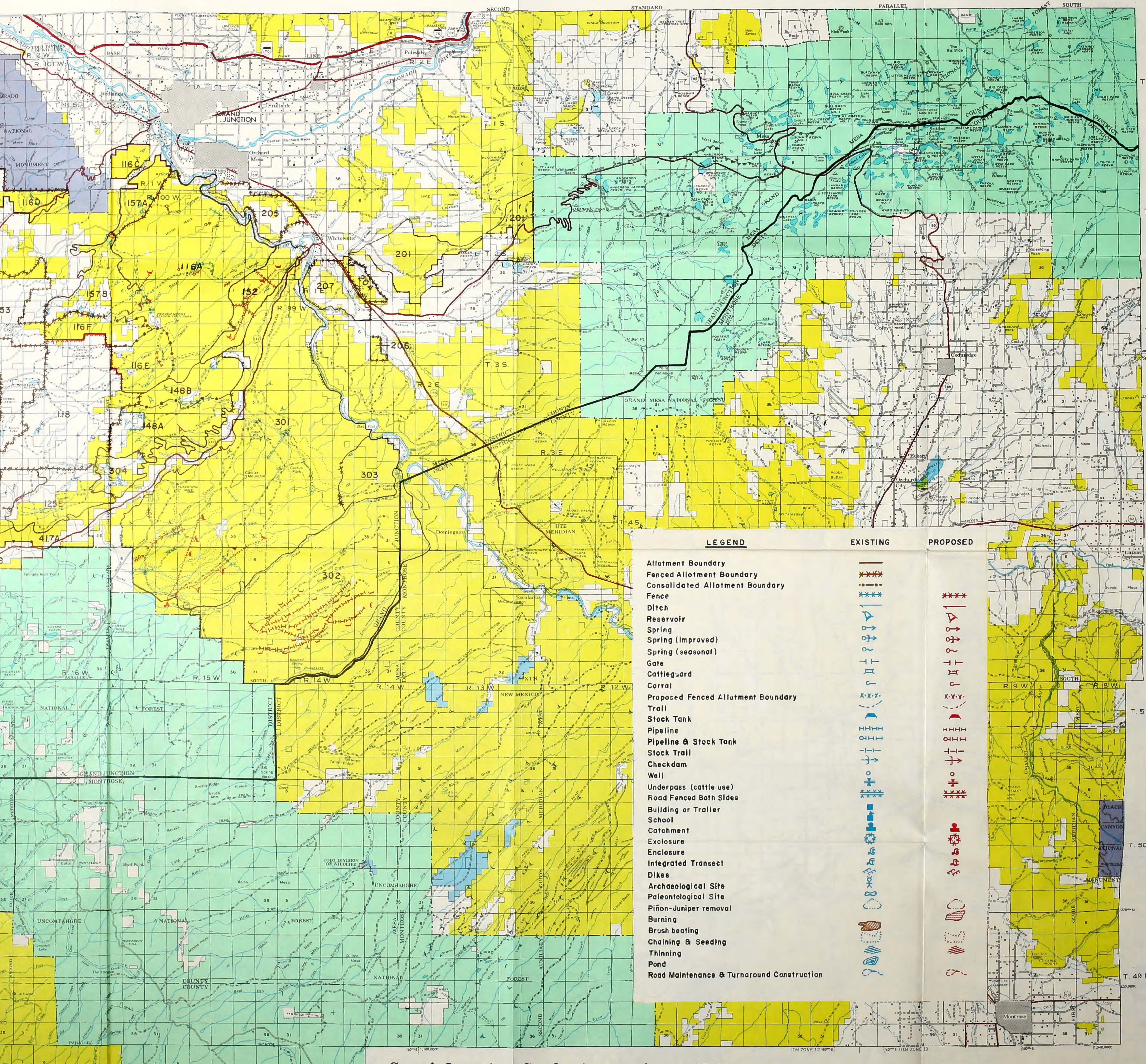
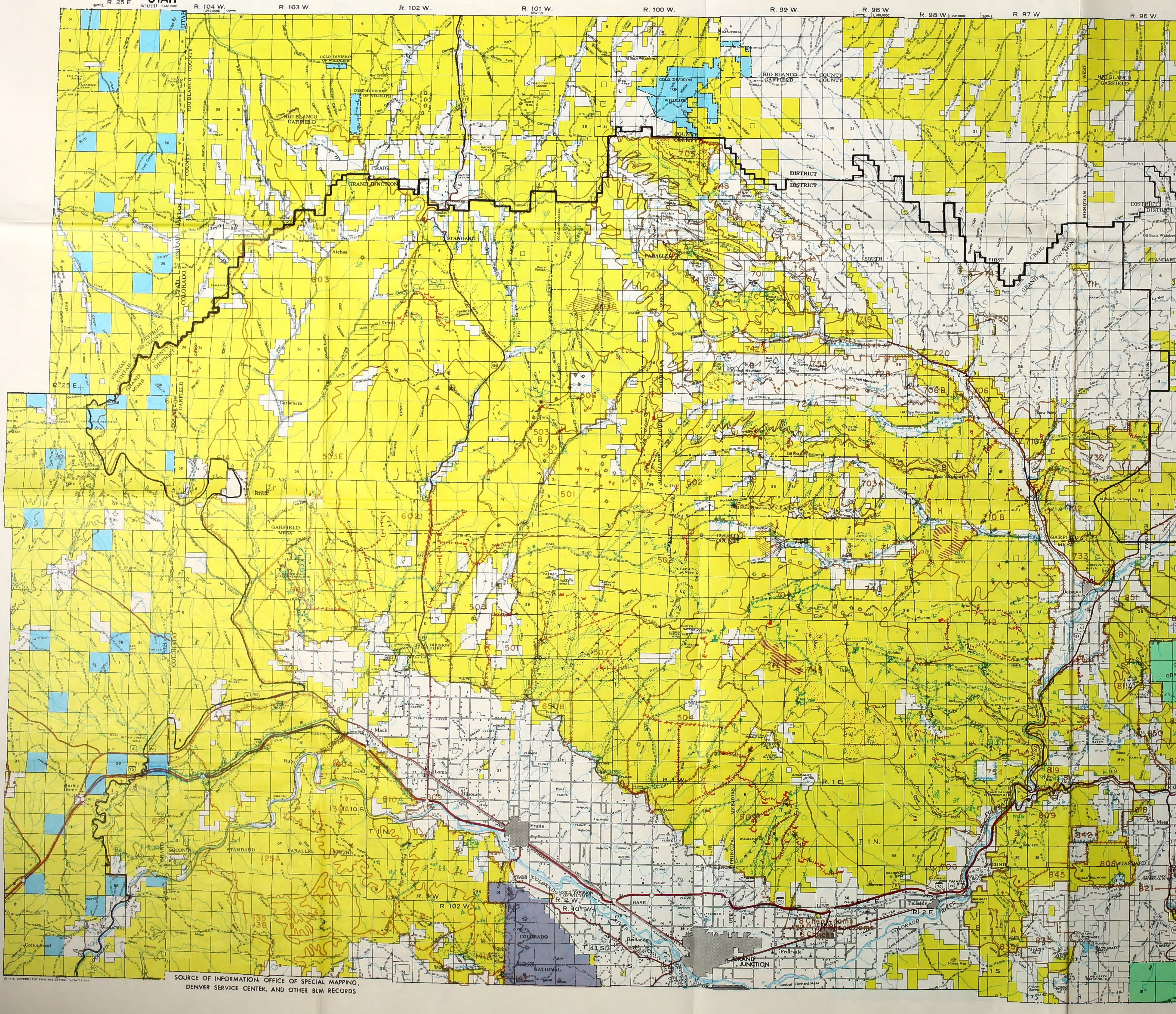
R 18 W.
R 17 W.
R 16 W.
R 15 W.
COUNTY
ARCHES NATIONAL MONUMENT
Pinon Mesa
Thimble Rock Point



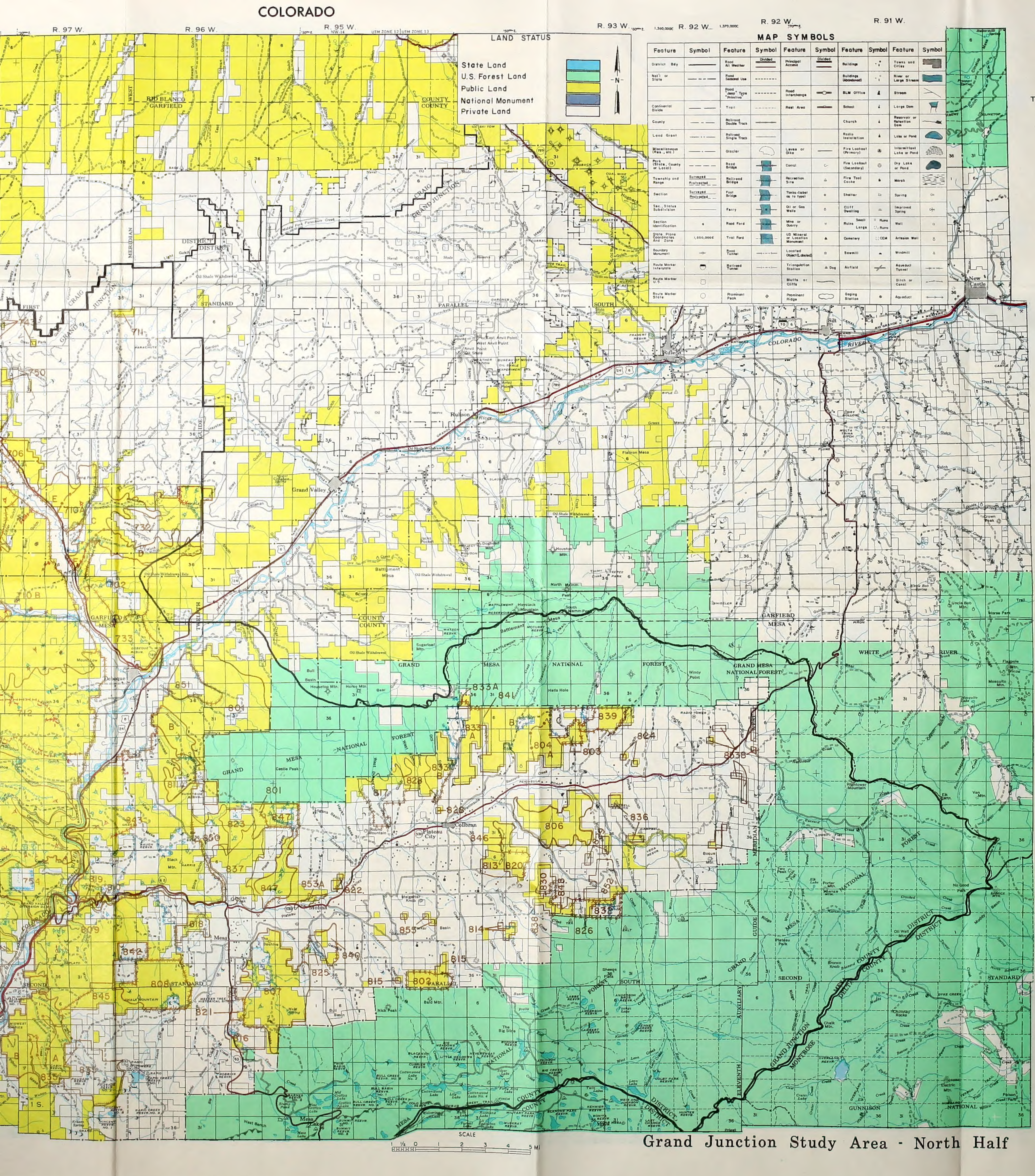
Grand Junction Study Area - South Half

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

COLORADO



SOURCE OF INFORMATION: OFFICE OF SPECIAL MAPPING,
DENVER SERVICE CENTER, AND OTHER BLM RECORDS



Grand Junction Study Area - North Half

ALLOTMENT NUMBER AND NAME

101	Fish Park
102*	Brush Hole
103	Haystack
105	South of the Road
106	East Tom's Canyon Common
108	Long Shore
A.	Long Shore Above Rim
B.	Long Shore Below Rim
C.	McKenzie
110*	Sieber Canyon
112*	Dierich Ranch
113	Fessler
115	Spring Creek
116	Bangs Canyon
A.	Bangs
B.	Files
C.	Dead Horse
D.	Landini
E.	Notch Spring
F.	Clarks Bench
G.	Upper Bench
118*	King-Rogers
124*	Wood
125	Aubert Brothers
A.	Lower Bench
B.	28 Hole
C.	Duval
D.	Skinner
E.	Snyder Flats
130	Colorado-Black Ridge
A.	Colorado Ridge
B.	Black Ridge
131*	Leslie-Bays
A.	Leslie-Bays
B.	Payne Wash
C.	Little Dolores River
D.	Flat Rock
133	Reservation
135	Knowles-Little Dolores Bench
A.	Little Dolores Bench
B.	Knowles
137	Timber Ridge
140*	Moore
141	Three Canyon's
A.	Burke
B.	Colorado River
C.	Radio Tower
145	Dugway
A.	Palisade Point
B.	Dugway
C.	Beaver Mesa
146*	North Fork
147*	Holloway
148	Thompson-Northeast Creek
A.	Thompson
B.	Northeast Creek
150	Meinhart
151*	Pine Ridge
152	Round Knob
153*	Burford Individual
154	Lost Canyon-Sugar Bench
155*	Little Dolores Canyon
157	Boulder Canyon-Ladder Canyor
A.	Boulder Canyon
B.	Ladder Canyon
159*	Cook Canyon
160*	Mabie
161	Coates Creek
162*	Hall
163	King
A.	West Tom's Canyon
B.	Fish Canyon
C.	Hill Creek Flats
D.	Breezer
167*	Battleship
201	Davis
202	Kannah Creek Common
203	Whitewater Common
204*	Highway
205*	Whitewater Hill
206*	Bean
207*	Kannah Creek
301	Gibbler Common
302	Wagon Park Common
304	Woodring
305*	Triangle Mesa
401	Palisade Flats
402	Bulldraw Common
405	Wright Draw
406	Blue Mesa
407	Bull Hill-Maverick Common
409	Sinbad Valley Common
A.	Sinbad Valley Common
B.	Ames
410	Ute Creek Common
411	Dolores River
A.	Dolores River
B.	Bull Canyon
C.	Casto Lines
415*	Tom Casto
416	North Creek
417	Unaweep
A.	Unaweep North Side
B.	Unaweep South Side
419	Hubbard
A.	Hubbard
B.	South Beaver Mesa
C.	Dakota Rock
420	GML
421*	Mule Trail Draw
A.	Mule Trail Draw
B.	J. L. Allotment
423*	EHL West Creek
424	Bergis North Mesa
425*	South Unaweep
A.	South Unaweep
B.	North Unaweep
427*	Turner Gulch
428*	Nelson Ranch
429	Dolores Point
430*	Salt Wash
431*	Cotton Wood
432*	Beeman
501	Big Salt
502	Coal Gulch-Roan Creek
503	Garr Mesa
A.	Garr Mesa
B.	Post Canyon
C.	Corral Canyon Mountain
D.	Sphinx-Mitchell
E.	Dry Canyon-Demaree
504	Hunter Wash
505	Buniger
506	Lapham Canyon Common
507	Little Salt
508	Morgenson
509	Mount Garfield Common
601	Badger Wash
602	East Salt
603	West Salt Common
604	Crow Bottom
609*	Spann
610	Maluy
612	Baker-Bitter Creek
613	Rabbit Valley
614*	Carbonera Rims
616	Prarie Canyon-Johns Canyon
701*	Bear Gulch
702	Berry Homestead
703	Spears
A.	Brink Pedigo Gulch
B.	East End Cow Mountain
C.	Horse Mountain
D.	Middle Cow Ridge
E.	Stoner
F.	Walker
G.	West Cow Mountain
H.	West Spears
704	Corcoran Wash
705	Brush Mountain Common
706	Burdick E. of Ranch, Tater Hills
A.	Burdick E. of Ranch
B.	Tater Hills
707*	Burdick Homestead
708*	Cameo Pasture
709*	Carr Creek
710	Rodeo Grounds
A.	Conn Creek
B.	East Spears Common
C.	Ind Allotment E. of Ranch
D.	Logan Wash Common
E.	McCurdy Wash
F.	West Logan Wash
711*	Conn Mountain Common
712	Coon Hollow Common
713	Winter Flats-Deer Park
714	Dougherty Gulch
715	Dry Fork
717*	Powell
A.	Powell
B.	4-A Ridge
719*	Eby Point
720*	Etcheverry
721	Head of Carr Creek
722	Kimball
A.	Kimball Creek
B.	Kimball Mountain
C.	Carbon
723	Henderson/4A Ridge
A.	Henderson Ridge Common
B.	4A Mountain
C.	Lower 4A Ridge
728*	Kimball Foothills
732	Logan End Common
733	Logan Gulch
735*	Lower Brush Mountain
736*	Lower Carr Creek Common
737	Lower Roan Creek
740*	Homestead
742	Paddock
743*	Parks Place
744	Roan Creek Common
745	Round Mountain
748	Upper Brush Mountain
754	Whittaker Flats
755	4A Individual
801	Sunnyside Canyon
802*	Bald Hill Common
803*	Grassy Gulch Common
804*	Hawxhurst
A.	Hawxhurst East
B.	Hawxhurst West
C.	McCurry
806*	Salt Creek Common
807	Spring Creek to Coon Creek
808	White Mountain Common
809	Wild County Common
810*	Alexander
811	Lyons-Anderson
A.	Lyons
B.	Anderson
813*	Red Mountain
814*	Guthrie
815*	Webb Isolated Track
816*	Bevan
817*	Clifton
818*	Davis
819*	Erven
820*	Gaptor
821*	Fetters
822*	Gipp
823*	Halfway House
824*	Collier Creek
825*	Hawkins D. Ind.
826*	Hawkins O. Ind.
827*	Clover Gulch
828*	Hight
829*	Hunter
830*	Horizon
832*	Jones
833*	Kinney
A.	Kinney
B.	Dry Kimball
835	Lower Rapid-Cottonwood
A.	Lower Rapid
B.	Cottonwood
836*	Long
837*	Heely
838*	Lorimor
839*	Collier
840*	Milholland
841*	Hittle Place Ind.
842*	Nichols
843	Big Park
846*	Robbins
847	Jerry Gulch
848*	Berthod Place
850*	Brown Place
851*	Baldridge Mesa
852*	Moss
853*	Molina Place
A.	Molina Place
B.	East of Collbran
355*	Charlesworth Ind. Tracts

* Indicates Reduced Management Allotments

Form 1279–3
(June 1984)

BORROWE

SF 85.35 .C6

Proposed dom
grazing pro

DATE LOANED	BORROWER

USDI – BLM